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HIGHLIGHTS

of the Work of the

Mississippi Experiment Station

Fifty-Seventh Annual Report

For the Fiscal Year Ending June 30, 1944

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Highlights Of the Work of the Mississippi Experiment Station

Fifty-Seventh Annual Report of the Director
Mississippi Agricultural Experiment Station
For the Fiscal Year Ending June 30, 1944

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This, the 57th annual report of the Mississippi Agricultural Experiment Station, is intended merely to highlight the comprehensive and expanding work of Mississippi's agricultural research program. Fuller information may be had from numerous publications issued during the year, especially in the monthly issues of Farm Research.

In a large agricultural state such as Mississippi there is considerable variation in climate and soils, and these and other causes have resulted in a considerable variation in farm enterprises and in management practices.

For example, while cotton is important in all areas of the State it is most important in the Delta. Similarly, livestock is of importance in every county but is most important in the brown loam and prairie. Fruits and vegetables are grown on most farms, but commercial truck growing is centered in the Crystal Springs Area.

In the different areas of the State, even where such commonly used crops as cotton and corn are grown, differences in soil require different fertilizer practices, and frequently different varieties.

Because of these differences, and because information for the guidance of farmers can be gained only at its source, a very important part of the work of the Mississippi Agricultural Experiment Station is conducted at the branch stations and experimental fields.

Thus, the Delta Branch Experiment Station, at Stoneville, is concerned with the problems of the Delta. Located in the heart of the Delta, its cotton work is comprehensive—varieties, breeding, culture, fertilizer and legumes, ginning. Yet its work with small grains and feed and forage crops is also comprehensive, and its work in horticulture, animal husbandry, and agricultural engineering are of increasing importance.

The Holly Springs Branch Station, located on brown loam soil, is concerned with the problems of agriculture in the hill section of north Mississippi. In addition to its work with general field crops and fertilization, much work has been done in recent years at Holly Springs on livestock, along with pasture establishment or improvement and maintenance, and the production of feed crops.

The South Mississippi Branch Station, at Poplarville, works with the general farm problems of south Mississippi. Cotton and corn are important here, as elsewhere, but the production of feed under the conditions of that area is emphasized and horticultural crops are of increasing importance.

The Tung Experimental Field, nearby, is devoted to research in the growth of tung orchards and the production of tung nuts for oil extraction.

A second type of branch experiment stations is concerned with specific commodities or area problems.

The Truck Crops Branch Station, at Crystal Springs, is working on the problems of commercial truck crop production. Its studies include varieties, fertilization, insect and disease control, and the fitting of new and familiar crops into the production program.

The Natchez Branch Station is working on the problems of the rapidly-expanding livestock industry of southwest Mississippi.

The Raymond Branch Station is now devoted largely to soil fertility problems as related to legumes, feed crops, and crop rotation.

The branch stations and the central station at State College comprise the Mississippi Agricultural Experiment Station. All work in close harmony, the research projects so integrated that each supplements the other and the results of all give a most substantial and realistic background to the publications and recommendations of the Station.

Highlights of the Work of the Mississippi Agricultural Experiment Station

CLARENCE DORMAN, Director

These two and one-half years of war have taught us a number of things: the valor of our men in all branches of military service, the wise leadership developed under democracy, the ability of a patriotic public to "take it," the almost unbelievable capacity of American industry to produce the implements of war—and the continued abundant supply of food and fibre from American farms despite seemingly overwhelming difficulties of production.

These war years have, in fact, demonstrated the fundamental soundness of American agriculture.

At mid-year, 1944, some 12 million men were in the various services of the Army and Navy. Perhaps 60 million men and women were engaged in the manufacture and transportation of ships and tanks and guns and planes and the thousands of other implements used in modern warfare and on the home front. Agriculture contributed its full share of fighting men and of factory workers.

During these 31 months we have had at least an approach to all-out war on the home front. War needs were, of course, given prior claim to materials, manufacturing capacity, labor, food, and clothing. The "critical" materials so urgently needed in war, as well as necessary labor, were withdrawn from civilian channels.

The result was that there were fewer silk stockings and pots and pans and automobile tires, less gasoline and sugar and coffee—less of what we thought indispensable until Pearl Harbor. Also, there was a shortage of things which farmers need for production—fewer tractors, plows, mowing machines, less fencing, definitely limited supplies of fertilizer, occasional shortages of seed, less of insecticides.

The whole agricultural situation looked dark, indeed; for short of necessary manpower, the farmer could not overcome this vital deficiency either by labor-saving equipment or by the substantially increased use of fertilizers.

Nevertheless, agriculture responded to the war need by producing two of the biggest crops of record in 1942 and 1943, and over-all outlook is quite promising for 1944. Rationing of meats and of many canned products was virtually suspended because processing plants and storage places were overcrowded. Rationing may be restored to provide more equitable distribution; but, thanks to American agriculture, no belt-tightening is in sight. There is plenty of meat, milk, vegetables, eggs, fibres for clothing—for the armed services, for Lend Lease, and for liberated peoples.

All this was possible because farmers and their wives and children, working harder than ever before and aided by favorable weather, did the best job of farming in the nation's history.

The progress made by American agriculture especially during the past three decades is exemplified throughout Mississippi today. The fund of knowledge gained by the experiment stations during the past 50 years is reaching farmers through Station bulletins, through splendid work of the State Extension Services, and through various other activities of men scientifically trained in agriculture. Thus, the land grant college movement begun during the Civil War is a vital factor in World War II.

FIELD CROPS, HAY CROPS PASTURE IMPROVEMENT

Members of the Department of Agronomy were considerably handicapped during the year just closed, but in spite of this have obtained much information useful in agriculture's war effort. Where the research program is sufficiently flexible, projects are being modified to provide information which farmers will need at the end of this war.

Field Crops

In recent cotton variety tests more emphasis has been placed on fiber quality. Many cotton strains now offered show improvement in this respect and in another year or two all major breeders should be distributing varieties with much stronger lint and other desirable spinning qualities.

In order to obtain information needed by farmers in planning for war production, tests have been conducted for the past several years to find how well soybeans will yield in various parts of the State and to find which varieties yield best.

From results obtained so far it would appear that soybeans for oil cannot be profitably grown on many thin hill areas of the State. Their growth for this purpose should be confined to somewhat fertile areas in valleys and elsewhere. If grain is to be produced, the varieties most suitable include Ogden, Arksoy, and Volstate.

A part of the soybean work is now being shifted to varieties suitable for livestock production in order to provide information and seed supplies which will be needed after the present emergency.

Oat variety trials show that Victorgrain, Stanton, New Nortex, and Letoria are among those best suited for the State. Where an early oat for grain is wanted, Victorgrain and Stanton can be used. Where a midseason or late oat is to be grazed lightly with a subsequent grain crop, the New Nortex and Letoria may be used.

Such barley varieties as Wintex, Texan, Marnobarb, etc., have appeared most satisfactory, but barley is rather sensitive to soil fertility and diseases. Until better varieties are found or developed it will not be possible for farmers to utilize this excellent crop to greatest advantage.

Forage Crops Breeding

Comparative hay-yield tests of miscellaneous summer crop plants continue to show that, on land adapted to their growth, the lespedezas are outstanding from the standpoint of yield, composition, and ease of curing. Korean is the more dependable variety on the black soils of the Prairie. Established sericea has outyielded all other hay plants. Kudzu and sericea produce 1 to 2 tons on land unsuited for other hay plants. Alyce clover is preferred to the annual lespedezas on sandy soils of the southern portion of the State, and only scarified seed should be sown.

Winter clover tests have shown Crimson to be the high yielding variety, followed by Red and White on Brown loam soils, by Persian and Lappa on Prairie soils, and by Hop on the Lower Coastal Plain. Studies show the clovers to respond to fertilizer in the order of Red, White, Persian, Crimson, and Hop. All varieties respond favorably to seeding on a firm seedbed.

Comparative feeding trials show the annual and sericea lespedezas, Alyce clover, and kudzu hays to be equal as maintenance rations for wintering beef cattle.

Selections and backcrosses of a Johnson grass x sorghum hybrid are showing promise of combining large stalks and short rhizomes. Selections show relatively high total sugar content and high fertility.

Studies show that wild winter peas vary in earliness, vigor, and seed production. Selections are being made in plantings throughout the State.

Figure 1. Cotton variety tests in Yazoo-Mississippi Delta.

Sorghum testing, spacing, and breeding was begun during the past year.

Growth-promoting substances for root development in kudzu cuttings are being studied.

Pasture Investigations

Phosphorus continues to be the most important pasture fertilizer element. Thirty to sixty pounds of available P_2O_5 on heavy soils and 60 to 90 pounds on sandy soils appear to be the most economical rates. Thirty to fifty pounds of available K_2O applied every third year should be used with phosphate on known deficient soils or on pastures fertilized with phosphate for 6 or 8 years. Phosphate carriers increase pasture yields in the order of basic slag, phosphate plus lime, phosphate, colloidal phosphate plus lime, colloidal phosphate, and lime alone, whether on available P_2O_5 or cost basis. Nitrogen increases grass population at the expense of legumes, and pastures should be fertilized for legume production.

Increased growth due to the application of phosphate is grazed in preference to unfertilized areas. Additions of lime increased the palatability when used with phosphorus but did not when used alone. Light surface applications of lime (500-1500 pounds) are better than large ones.

For a combination of spring clovers and summer legumes in pastures, spring clover should be kept less than 4 inches high. During times of seed scarcity it is advisable to seed spring clovers in bottoms and lespedeza on hills which eliminates early spring competition.

Weeds and undesirable plants result from both over- and under-grazing. Mowing continues to prove a very valuable practice.

Pasture seedlings should be made on a firm seedbed. Dallis grass responds to soil preparations in the ratio of the amount of preparation.

Hybrid Corn Program

The hybrid corn program in Mississippi is in cooperation with the U. S. Department of Agriculture. The main hybrid performance tests were grown at Raymond, Natchez, and Poplarville. Out-

standing in yield were the Louisiana hybrids 468, 3802, and 173A, which were among the top yielding entries at each of the seven locations. The Louisiana hybrids had good quality grain relatively free from weevils.

Uniform single cross tests of yellow and white inbreds were grown in Mississippi and revealed that several North Carolina, Texas, and Kentucky inbreds can be used in Mississippi. These were also grown in other Southern states, and the results indicate that the general interchange of inbreds among the Southern stations which is now being practiced will be very profitable to all because the best hybrids will undoubtedly be made up of inbreds from several states.

Spacing tests indicate that many Mississippi farmers are not leaving enough stalks per acre. In rows 40 inches apart, one stalk each 20 inches gave best yields, while in Raymond and West Point tests, one stalk each 13 inches gave more corn than one stalk each 40 inches.

Rates of nitrogen (nitrate of soda) side-dressed at about the time corn was knee high gave indifferent results, possibly because of the severe drouth. A deep versus shallow application of nitrate of soda showed a slight though negligible advantage for the shallow application.

SOIL FERTILITY PROBLEMS IN PRODUCTION OF CROPS

Phosphate Investigations

Many non-leguminous crops, especially corn, cotton and oats, often fail to respond to phosphate fertilizers, even on soils which are low in phosphate. Investigations have shown that there is a close relationship between the use of nitrogen and phosphorus by the plant. Many crops, which fail to respond to phosphate on soils low in nitrogen, give an excellent response when adequate amounts of nitrogen are added to the soil.

Boron Studies

Experiments have shown that many Mississippi soils need small applications of borax for the maximum production of certain crops. Many soils growing alfalfa are showing an excellent response to borax applied at the rate of 25 pounds per acre. At Holly Springs on Grenada silt loam, 10 pounds of borax per acre has increased the yield of seed cotton an average of 125 pounds per acre for 3 years over the unboraxed plot. Many truck crops are also showing an excellent response to borax.

Corn Fertilization

Experiments conducted throughout the State have shown that corn must be fertilized with nitrogen in order to produce the most profitable yield. Nitrogen may be applied effectively to corn either under the crop or as a side-dressing. In either case it should be applied at the rate of at least 32 pounds per acre (200 pounds nitrate of soda or 100 pounds of ammonium nitrate). Each pound of actual nitrogen applied to corn will normally produce ½ bushel more than unfertilized corn, and each dollar invested in nitrogen fertilizer will produce a profit of $4.00 to $5.00, at the present price of corn.

Experimental results show that if all of Mississippi's corn land were properly fertilized with nitrogen, the average State yield could be increased from 15 bushels to 25 or 30 bushels per acre. Then Mississippi would produce about 30 million more bushels of corn than she does now.

Liming

To supply the need for more information regarding lime, the Mississippi Station has put out five detailed field experiments at various points in the State to determine the optimum rate of lime for various crops. Lime was applied at rates as indicated by laboratory test to raise the pH of the respective soils to 6, 6.5, 7.0 and 8.0.

Ogden soybeans were grown for beans on one of these tests, located on a Gre-

nada silt loam soil on the Holly Springs Branch Station. Lime applied to raise the pH of the soil to 7 caused an increase of over 2 bushels per acre and gave the best yield of all the lime treatments.

Another similar test with hairy vetch as the indicator crop is located on the South Mississippi Branch Experiment Station at Poplarville. The vetch yields showed that on this Ruston soil there was no important response to lime at any of the rates applied.

Fertilizer for Vetch

A vetch fertilizer test has been conducted for the past 5 years on a Grenada silt loam soil at the Holly Springs Branch Station. This soil has responded markedly in the past to applications of lime or basic slag at the rate of 300 pounds per acre in the drill. Last fall four pairs of plots within this test which had had the same prior fertilizer treatment were limed. One plot of each pair was limed broadcast in the amount necessary to increase the pH of the soil to 7; and to the other plot, 300 pounds of dolomitic lime per acre was applied in the drill. Each lime treatment increased the yield of vetch nearly 50 percent over the 300 pounds per acre treatment of 0-8-4 fertilizer.

Soil Survey

A technical soil survey has been completed of Tunica County and the regular survey report now awaits publication in the United States Department of Agriculture. In addition to this report, a brief practical report has been prepared and published for the farmers of that county by the State Experiment Station. Each farmer was given a map of his farm on an 8-inch scale and a soil type.

This is the first time any group of farmers of Mississippi, or probably the entire South, has ever been able to get this kind of service as an aid in farm planning and proper land use. It is hoped that after the present conflict other counties in our State can be mapped and a similar service rendered.

Nitrogen and Soil Acidity

Nitrogen fertilizers exert their influence on the chemical make-up of the soil more than other fertilizers do. Ammonium sulphate, for example, is acid-forming because of both the ammonia and sulphur which it carries. Likewise, nitrate of soda and cyanamid exert a basic effect on the soil because of the soda and the lime, respectively, which they carry.

When these fertilizers are used on sandy soils already low in the mineral nutrients, the character of the fertilizer exerts itself very soon. But with fertile soils the strongly acid-forming fertilizer ammonium sulphate has shown a comparatively small change in acidity in the surface soil after a 20-year period at the Delta Branch Experiment Station.

When this same soil is transferred to large pots, which prevents the normal exchange of bases in the soil column as under natural conditions, and fertilized heavily with the above named fertilizers and crops grown on it, the character of the fertilizer shows up very soon. The sulphate pot becomes quite acid; the cyanamid and nitrate of soda pots become basic with the latter developing a strong tendency to puddle, or run together after rains.

Under field conditions where a good winter legume crop is included in the rotation, these extreme conditions would not occur. This suggests that a farmer who makes heavy yearly applications of nitrogen fertilizers would probably avoid any tendency towards these objectionable characteristics by alternating the sources of nitrogen and including a winter legume occasionally.

AGRICULTURAL ECONOMISTS SURVEY PRODUCTION NEEDS

The program of work of the Department of Agricultural Economics for the past year has been influenced materially

by agricultural war production needs. Work on all projects has been adjusted wherever possible to provide information useful in the war program and in the period following the war.

Agricultural Production Capacity Study

Working in cooperation with other departments and agencies, a careful appraisal was made of the immediate and long-time agricultural wartime production capacity in Mississippi. This study provided the basis for the establishment of 1944 production goals and which will serve as useful background materials in the formulation of the 1945 programs and the establishment of production goals, and supplied the basic information for formulating an educational guidebook used in the program designed to carry the 1944 program into effect.

Agricultural Adjustment Report

All members of the Department worked cooperatively with other departments and agencies in the preparation of a report on Mississippi agriculture designed to provide information that will be useful to farmers in making adjustments when war demands for agricultural products cease, and to public officials and others in the formulation of policies and programs as related to the State's postwar agriculture.

Trends in Farm Land Values

The welfare of agriculture is influenced materially by the relative stability of agricultural land values as related to net earnings of agriculture. As a result of unpleasant memories associated with high land values and subsequent deflation following the last war, the Department in cooperation with Farm Credit Administration and the Bureau of Agricultural Economics studied the trends in land prices during the war period.

It was found that there is an active and rising land market within the State and prices could easily rise above the level that prospective future net earnings would justify. Land values have risen approximately 40 percent since 1941, with considerable variations from area to area. The present situation seems to warrant the admonition to prospective buyers of agricultural land to stop, look, and be careful.

Land Tenure in Upper Coastal Plain

Land tenure in its various forms in relation to production and levels of living was the subject of a study in the Upper Coastal Plain Area. The findings indicate that the natural rate of population increase in the area creates great pressure on the land and that already many farms have acreage too small to produce a satisfactory family living. On many larger farms, land not in cotton is inadequately utilized, farm machinery is inadequate, and on most farms, the labor force is under employed. Tenants generally have smaller and less diversified operating units than owners; 88 percent of the cash receipts of croppers in 1942 came from sales of cotton and cottonseed, as compared with 77 percent for all tenure groups. The yield per acre for croppers and tenants was likewise below that of owners.

Black Prairie Farm Adjustment Study

A farm management study in the Black Prairie type-of-farming area indicates that the two most important factors associated with above the average farm income were livestock enterprises and relatively full year-round employment for farm labor. The return per acre or per day of labor was lower for livestock enterprises than for cotton, but the increase in the number of acres utilized and days worked increased the farm income over what it was when livestock enterprises were neglected or of minor importance.

On the 108 farms studied, only 37 percent of the cotton and 2 percent of the corn acreage were fertilized in 1942. A comparison of fertilizer practices with recommendations of the Experiment Station indicates that yields of major crops could be increased materially through the

usage of increased quantities of fertilizer. Feeding rates for livestock were too low on most farms in the Prairie to insure best returns from livestock. Prairie farms were only slightly deficient in corn and grain feeds, but very deficient in hay and pasture.

Shortleaf Pine Adjustment Study

Pre-war and current farm organizations in the Shortleaf Pine Area have been studied to learn how agricultural resources of the area may be utilized to produce greater amounts of the farm products. Additional adjustments in land-use, in the size of farms, in acres of particular crops, and in livestock numbers seem desirable. Improved production practices also offer possibilities for increasing the output per worker and per acre while decreasing production costs per unit.

This study illustrates how total production may be increased by restricting the acreage planted to corn, applying fertilizers generally, and using the least productive land for hay and pasture. Production increases would be derived largely from using improved practices as well as from putting labor and land, which have heretofore made only low returns, to more efficient use.

Marketing Areas, Facilities, and Problems

As a basis of building a sound marketing research program, the Agricultural Economics Department made a study of the commercial production of the major agricultural commodities produced in Mississippi in relationship to the marketing system and facilities available.

The areas of commercial production of each of the major agricultural commodities were determined and in these areas the marketing situation was studied to see if the facilities and services were adequate, and if not, to determine the main marketing problems for each commodity. The results of this study are being used as a basis for planning a long-time marketing research program for the major agricultural products of Mississippi.

Cotton Ginning as Related to Cotton Marketing

In 1943 there was a total investment of approximately $20,000,000 in cotton ginning plants in Mississippi. Farmers pay from $7,000,000 to $8,000,000 a year, depending upon the size of the cotton crop, for ginning services and the bagging and ties in which the cotton is wrapped.

In order to determine the influence of the ginning machinery and equipment on the cost of performing the ginning service as well as on the quality of lint, the Agricultural Economics Department in cooperation with the Cotton and Fiber Branch of the Office of Distribution made a study of the cotton gins operating in four Central Mississippi counties. The modern, well-equipped, more efficient gins were found to be superior in size, equipment, efficiency of operation, and were capable of turning out a higher quality of cotton.

Livestock Auctions

Livestock auctions are the most important single outlet for livestock in Mississippi. Based on the estimates of all auction operators in the State, over 800,000 head of livestock valued at approximately $20,000,000, were sold through Mississippi auctions in 1943. Prices paid at auctions compared rather favorably with those paid at other markets in Mississippi, and were higher at large than at small auctions. Most auctions charged 5 percent commission on gross sales. In addition, some auctions assessed charges for yardage, insurance, and weighing. These charges were higher in Mississippi than in adjoining states and the nation as a whole.

Farmers severely criticize the high selling charges, and 7 out of every 10 reporting stated that they would patronize auctions more if selling charges were lower. The danger of spreading diseases

was the most common criticism made of auctions by farmers, and over four-fifths of the 682 reporting stated that they would patronize auctions more if some form of disease control were in effect. Mississippi is one of 18 states that still have no laws or regulations governing auction markets.

RESEARCH ON COTTON TILLAGE, SOIL EROSION, ROOT ECOLOGY

A Study of Soil Erosion Losses

Rainfall of 17.47 inches, about 8 inches below normal, caused over 40 tons soil loss per acre from a bare plot on a 9 percent slope July 1 to December 31, 1943.

Rainfall of 26.05 inches January 1 to May 1, 1944, caused over 75 tons per acre erosion from the same plot.

Erosion was the heaviest on record during the April 1944 rain on plots spaded in preparation for a cotton crop.

Where vetch was turned under in March, soil losses in April varied from 1000 pounds per acre on a 2.5 percent slope plot to 44,000 pounds per acre on a 12.5 percent slope.

When bare land was turned, the soil losses for the same period were 2,000 pounds per acre on a 2.5 percent slope plot and upward to 60,000 pounds per acre on a 12.5 percent slope plot.

This year vetch seemed to have a beneficial effect in reducing erosion losses even after turning under.

Legume Planting

Tests are being continued on planting methods for vetch, particularly on the heavy Blackbelt soils. Methods involving very little plowing and preparation appear best. Excessive working of the heavy clays in the fall dries the surface to the extent that germination of legume seed is difficult.

Root Ecology

Observations on the natural aeration of several Mississippi soils have been completed, with results as previously reported. Field root studies during the past year were continued. Mature cotton under Houston clay had 50 to 90 percent of the small "feeder" roots in the surface foot of soil. Mature cotton under an artificial Hyman profile had a fairly uniform distribution of small roots to a depth of 5 feet and some to a depth of 7 feet. The profile resulted from the filling of a deep ditch with top soil, logs, etc., about 30 years ago. Under Sarpy clay and Sarpy fine sandy loam, small roots developed abundantly in the subsoil, although the greatest root development occurred in the surface foot. Under Ruston sandy loam, small roots developed poorly in the subsoil, especially on unfertilized plots. The subsoil is variable, but it is characteristically deficient in available phosphorus and nitrogen.

Vetch and oat roots developed during the winter and spring of 1943-1944 chiefly in the surface 6 inches of Houston clay. A few roots attained a depth of 24 inches. Water logging and poor aeration influenced the depth and pattern of root distribution, although available phosphorus in the subsoil was also a factor.

The effect of various concentrations of oxygen, carbon dioxide, and nitrogen (alone and in mixtures) on seedling root development was investigated in nutrient solutions. Seedling root elongation appeared unaffected by carbon dioxide concentrations up to 15 percent. Elongation was reduced at 45 percent and prevented at 60 percent. Minimum oxygen concentrations for root elongation occurred between 1 and 1.5 percent, while optimum elongation took place at concentrations of 7 to 21 percent. Branch root formation followed after air, containing 21 percent oxygen and 79 percent nitrogen replaced the pure nitrogen. Greatly reduced root elongation occurred at 90 percent oxygen and above.

The effect of nitrate and ammonium nitrogen on the top- and root-growth of seedling cotton was compared, using different percentages of oxygen in the air bubbled through the nutrient solution

around the roots. The same general relationship between percentage of oxygen and root elongation was obtained with both nitrate and ammonium nitrogen: however, top-growth was always better with nitrate nitrogen than with ammonium nitrogen.

PROBLEMS IN FEEDING AND MANAGEMENT OF LIVESTOCK

Types of Ewes for Wool and Spring Lambs

To determine the most profitable foundation ewes for wool and spring lamb production, a comparison was made of two lots of Western ewes with a group of home-raised ewes out of native dams and sired by a Corriedale ram.

The average gross return per ewe for the 3 groups, including the sale of lambs and wool, was $12.53 for the Montana, $11.87 for the Texas, and $12.61 for the Corriedale-native ewes. About one-third of the gross income was from sale of wool and two-thirds from sale of lambs. The Corriedale native ewes yeaned 85 percent of their lambs in December and January, most desirable date of yeaning. The lambing percentages were 103 for the Montana, 96.5 for the Texas, and 111.6 for the Corriedale-native ewes. Eighty percent of the Montana lambs graded choice and good, while only 73 percent of the Texas, and 61 percent of the Corriedale-native lambs fell in these two grades.

The average weaning weight of lambs of the three groups was 69.6, 68, and 67.3 pounds for the Montana, Texas, and Corriedale native groups, respectively. The 1944 clear wool sold for $0.50 per pound. Choice lambs sold for $14.50; good, $13.25; medium, $10.50; and common, $6.00 per 100 pounds in the Starkville pool June 10, 1944.

Cottonseed Cake, Meal for Finishing Calves

A second feeding trial was completed in April, comparing cottonseed cake and cottonseed meal when fed in limited amounts and when full fed, to 470-pound weanling steer calves. All lots were fed a basal ration of 6.5 pounds of sorghum silage, 3 pounds of No. 1 alfalfa hay, and 0.2 pounds of oystershell flour per calf per day.

Four lots of 12 calves each were used in this study. Lots 1 and 2 were fed 8 pounds of cottonseed cake and 8 pounds of cottonseed meal per calf with all the corn they would clean up, in addition to the cake and meal. Lots 3 and 4 were fed all the cottonseed cake and cottonseed meal they would eat with no other concentrate.

In lots 1 and 2, where cottonseed cake and cottonseed meal were limited to 8 pounds per calf per day, no significant differences were noted as to palatability and efficiency of the two feeds. The calves in lot 2 graded slightly higher and sold for 25 cents per cwt. more than the calves fattened on cottonseed cake.

The calves in lots 3 and 4, finished on cottonseed cake and cottonseed meal, made unsatisfactory returns with net losses of $2.18 and $2.77 per calf, while the calves in lots 1 and 2 made satisfactory gains and returned a profit above feed and calf cost of $8.57 and $10.52 per calf, respectively.

Urea Treated Silage for Beef Animals

During the wintering period of 1942-43, preliminary studies indicated that sweet sorghum silage, which had been treated with 10 pounds of urea as it was put into the silo, was superior to untreated silage for wintering mature beef cows. This study was expanded during the 1943-44 wintering period, to include 3 lots of 10 mature cows each and 3 lots of 10 uniform weanling heifers each.

The cows were grade and pure Hereford, ranging in age from 3 to 10 years. They were in strong condition at the beginning of the experiment but had begun to shrink in weight from lack of feed on pasture. The weanling heifers were

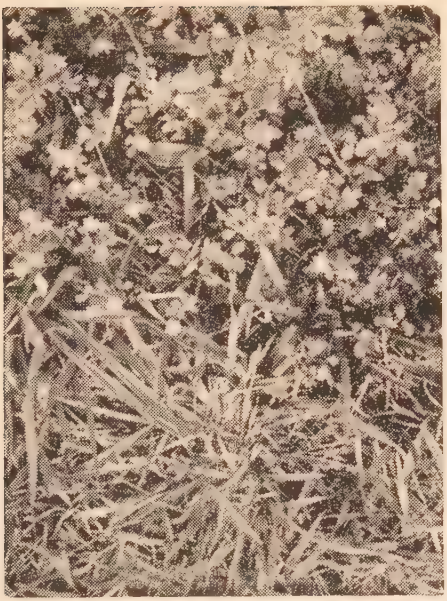

Figure 2. Looking directly down on a Carpet grass sod, showing how completely it is crowding out Hop clover. Note the density of the sod formed by this grass. Photograph taken at the Natchez Branch Station.

out of grade Hereford and Angus cows and sired by registered Hereford and Angus bulls. They had lost their milk bloom at the beginning of the test and would have been considered to be in fair stocker fleshing condition.

The 3 lots of cows and 3 lots of heifers were wintered for 68 days on the following rations: Cows: lot 1, 30 pounds untreated sorghum silage, 1 pound cottonseed meal, and 5 pounds Johnson grass hay; lot 2, 35 pounds untreated sorghum silage and 5 pounds Johnson grass hay; lot 3, 35 pounds urea treated silage and 5 pounds Johnson grass hay. Heifers: lot 4, 15 pounds untreated sorghum silage, 1 pound cottonseed meal, 3 pounds Johnson grass hay; lot 5, 20 pounds untreated silage and 3 pounds Johnson grass hay; lot 6, 20 pounds urea treated silage and 3 pounds Johnson grass hay. The cows fed the untreated silage ration lost more than 1 pound each day during the wintering period, those fed urea-treated silage gained an average of 2 pounds per head for the wintering period, and those fed untreated silage without meal lost 21 pounds per head. Carotene content of the treated and untreated silage used in this experiment were too variable to note any differences.

Minerals in Beef Production

The 4 lots of mature breeding cows have been continued on this study and the second experimental calf crop was produced in 1943. The steer calves were again disposed of at weaning time, as was true with the 1942 calves, and the heifers were retained for future studies.

The cows and calves on the College farm on good prairie pasture, again in 1943, led the three groups on the Land Use Experimental Area farm on flatwoods soil in calving percentage, weight of calf at weaning, and weight at weaning per day of age.

The third application of 600 pounds of lime and approximately 70 pounds P_2O_5 was made to the East pasture on the Land Use Area farm. Bonemeal was fed ad libitum to the cows in the Middle pasture, and cattle in all 3 pastures were given block salt. All three pastures were mowed in the late summer of 1943. The 1943 calving percentage of the four groups of cows was as follows: College 81, fertilized pasture group 64.7, bonemeal 47, and check lot group 75. The 1943 weaning weight of the four groups of calves was 475 pounds for the College, 424 pounds for the fertilized pasture, 413 pounds for the bonemeal, and 398 pounds for the check lot group.

It was observed in 1943 that considerable improvement had been made in vegetative growth of pasture plants where phosphate and lime had been added.

Workstock Investigations

Breeding and feeding studies have been continued with 25 mares, 10 jen-

nets, and 4 jacks, to determine efficiency factors in individual work animals. Approximately 40 mule colts, ranging in age from suckling colts to 4 years old, are now available for this study. Among the mule colts now on hand are individuals out of heavy draft type mares sired by a big-boned heavy jack, those out of same type of mares and sired by a small 650-pound jack, and individuals out of light saddle mares sired by jacks of different types.

Data on a limited number of individuals indicates that mules out of heavy draft type mares sired by big-boned jacks are too leggy, coarse, and rough for satisfactory farm mules. On the other hand, mules out of light mares weighing 800 to 1000 pounds, even though sired by big-boned jacks, are too small for useful farm mules.

Finishing Pigs on Large Amounts of Cottonseed Meal

Experiments have been continued to determine the maximum amount of cottonseed meal that can be included with safety in the swine rations and to determine the efficiency of factors, including grazing and ferrous sulphate, that might offset toxicity.

A feed mixture composed of 70 pounds ground corn and 30 pounds of cottonseed meal treated with 3.4 pounds of ferrous sulphate per 100 pounds of cottonseed meal, was fed to pigs in a third feeding trial conducted in 1943 and resulted in no apparent trouble in either test. Ten pigs were self-fed this mixture in 1941, 1942, and 1943. Each year the pigs had access to sudan grass pasture and a mineral mixture composed of 10 pounds of oystershell flour and 1 pound of salt.

The 10 pigs on test for 59 days made an average daily gain of 1.74 pounds and consumed 367.75 pounds of feed per 100 pounds of gain. The pigs in the check lot, fed a mixture composed of 85 pounds of ground corn and 7.5 pounds each of tankage and cottonseed meal, made an average daily gain of 1.91 pounds and consumed 360.05 pounds of feed per 100 pounds of gain.

A mixture of 70 pounds ground corn and 30 pounds of cottonseed meal fed with no treatment, killed 1 pig out of 10 in 1941, and 2 pigs were sick, thumping, and losing weight when the feeding trial ended. No apparent troubles were noted in two out of three feeding trials. The pigs consuming the untreated meal in 1943 made an average daily gain of 1.77 pounds for 59 days, and consumed 354.69 pounds of feed per 100 pounds of gain.

Corn, Oats, and Barley for Finishing Pigs

Four lots of 10 pigs each were self-fed on green oat pasture. The pigs in lot 1, self-fed a mixture of 90 pounds ground corn and 10 pounds of tankage for 47 days, made an average daily gain of 2.54 pounds and consumed 343.19 pounds of food for 100 pounds of gain. The pigs in lot 2, self-fed a mixture of 97.7 pounds of ground Delta oats (weight 39 pounds per bushel) and 2.3 pounds of tankage for 52 days, made an average daily gain of 1.79 pounds and consumed 441.43 pounds of feed per 100 pounds of gain. The pigs in lot 3, self-fed a mixture of 97.7 pounds of ground commercial oats (weight 32 pounds per bushel) and 2.3 pounds of tankage for 54 days, made an average daily gain of 1.44 pounds and consumed 470.37 pounds of feed per 100 pounds of gain. The pigs in lot 4, self-fed a mixture of 95.3 pounds of ground Delta barley and 4.7 pounds of tankage for 47 days, made an average daily gain of 2.12 pounds and consumed 367.70 pounds of feed per 100 pounds of gain.

CHEMISTRY DEPARTMENT MAKES VITAMIN INVESTIGATIONS

Losses of vitamin A and carotene in butter were found to be influenced by different methods of handling the cream.

Over a period of 18 months butter was obtained from three creameries, each using different types of cream; viz., (1) sweet cream separated at the creamery: (2) sweet cream separated on the farm mixed with sweet cream separated at the creamery; and (3) sour cream separated on the farm. The average vitamin A and carotene in butter made from cream types (1) and (2) were practically the same. Butter made from cream type (3) contained about 15 percent less vitamin A and carotene than butter made from cream types (1) and (2).

As turnip greens are a good source of carotene, it was thought probably the carotene content could be increased in the turnip greens by fertilization with nitrogen. Four varieties—Shogoin, Purple Globe, Pomeranian, and Seven Top—were grown with and without the application of nitrogen fertilization. Carotene determinations made by the Chemistry Department showed that this application of nitrogen gave only a slight increase in carotene.

Cooking losses of carotene in vegetables cooked at Mississippi State College Army Training Camp were found to vary quite considerably from one vegetable to another. Loss of carotene from before cooking to end of serving period in canned peas was 22 percent, turnip greens 19.7 percent, spinach 24 percent, and snap beans 49 percent. Losses of other vitamins not assayed in this department are being reported by the Home Economics Department, also cooperating in the National Cooperative Experiment Station Project on the cooking losses at army and navy training camps at Land-Grant Institutions.

Continued interest in industrial uses of cottonseed protein is being manifested as the Chemistry Department is constantly being called upon for supplies of protein for experimental uses.

RESEARCH ON PROBLEMS OF MISSISSIPPI DAIRYMEN

Input as Related to Output in Milk Production

The Dairy Department cooperating with the Bureaus of Agricultural Economics and Dairy Industry, U. S. Department of Agriculture, and other Experiment Stations, has completed several years' work with dairy cows on different planes of nutrition.

Based on the results of experiments extending over a period of 4 years, the following conclusions may be drawn:

1. The economy of a dairy ration depends quite largely upon the ability of the cow, the relative prices of the feeds as compared with those of the dairy products, and the effect of the quantity and quality of the feed on the health and physical vigor of the cow.

2. The cost of 100 pounds of total digestible nutrients will increase, as a rule, with the increase of total nutrients fed.

3. Other things being equal, the ratio of total digestible nutrients in the concentrates as compared with that in the roughages will increase with the increase in nutrients fed.

4. Satisfactory results were not secured by feeding either the 85 percent or the 100 percent ration recommended by the Haecker Standard.

5. Rations containing 115 to 130 percent Haecker Standard proved most economical.

6. The relation of the amount of roughage and concentrates to be fed to dairy cows will depend upon the size of the cow, her ability as a producer, and the relative prices of milk and feed.

7. Cows that were fed from 1 to 3 years at comparatively low feeding levels without pasture and as a result showed loss in liveweight, a general unthrifty condition, and low milk production, were turned on pasture, fed liberally, and given a rest period. During their next

lactation period the cows were fed approximately the requirements of the Haecker Feeding Standard for maintenance plus 115 percent of this Standard for production. The results show (a) that such cows can be brought back to normal production and (b) that a good pasture is not only a cheap feed but one of the best in maintaining the health and vigor of the animal.

Johnson Grass Silage for Dairy Cows

In cooperation with the agricultural engineering department, immature Johnson grass was cut at the stage when it was just beginning to head out, and was put into small trench silos. In one silo, the grass was run through the silage cutter, and no preservative was added. In another silo the Johnson grass was run through the silage cutter, and 60 pounds of blackstrap molasses per ton was added. In the third silo the Johnson grass was packed into the silo whole, as it was brought in from the field. The silage did not keep well in these small silos. The grass silages were higher in carotene than the sorghum silage.

The results of the feeding the first winter indicate that mature Johnson grass is less valuable than immature. In the feeding the second winter, better results were obtained from the cut Johnson grass than from the crushed. The cut kept better and was more palatable. The third year there was very little difference observed in the feeding value of the cut immature Johnson grass silage without preservative and the cut immature Johnson grass silage with 60 pounds blackstrap molasses per ton added and the sorghum silage. The uncut grass silage without preservative did not keep and no feeding tests were conducted with it.

Mineral Requirements of Dairy Cows

A comparison of a ration made up of home-grown feeds with a ration of greater variety of concentrates containing added calcium, has been in progress for 6 years. Group 1 received only home-grown feeds including cottonseed meal and no additional minerals except salt. Group 2 received a greater variety of concentrates, salt and oystershell flour.

From the standpoint of physical condition, weight of animals, breeding and calving records, very little difference could be detected between the animals of the two groups. In milk production, however, the cows receiving a variety of concentrates gave a total of 33,775 pounds of milk, while those of group 1 gave 30,180 pounds of milk, a difference of 10.6 percent.

The Experiment Station Dairy Department is recommending the following practices in feeding minerals to dairy cows: (1) In the so-called lime belt of Mississippi, the grain mixture should not contain more than 2 percent oystershell flour in addition to 1 percent salt. (2) Outside of this area with the forage containing only small amounts of phosphorus, the addition of 1 percent of oystershell flour and 1 percent of bonemeal to the grain ration is recommended in addition to 1 percent salt. (3) In some extremely phosphorus-deficient areas, the entire mineral supplement should consist of only bonemeal (2 percent) and 1 percent salt. (4) In the entire State, cows should have, at all times, access to a mineral supplement in the pasture consisting of bonemeal and salt in a ratio of 4 to 1 or higher, besides the salt available at all times. (5) In the absence of bonemeal from the market, rock phosphate with a guaranteed content of less than 0.3 percent fluorine will have to be substituted for the bonemeal. (6) The purchase of expensive mineral mixtures is not recommended. (7) Stock tonics are not, as a rule, suitable substitutes for minerals.

Vitamin A and Carotene Content of Creamery Butter

Carotene and vitamin A determinations have been made from March 1943 to June 1, 1944. The amounts of carotene

and vitamin A followed in general the quality of the pasture. The months which showed the lowest level of carotene and vitamin A were December, January, February, and March, when the vitamin A averaged 8995 International units per pound of butter. During April, May, June, and July 1943, the vitamin A content averaged 11,610. During these months a severe drouth lowered materially the quality of the pasture. During April, May, and the first part of June 1944, the better pasture was reflected in an average vitamin A content of 13,950 units per pound of butter. Butter made during August, September, October, and November 1943, had an average vitamin A content of 11,910.

A comparison of the vitamin A content of the sweet and sour cream butter showed a trend in favor of the sweet cream of about 15 percent.

Butter that was stored at 0° F. for 5 months did not lose any of its vitamin A content. Butter held at 45° F. or under conditions similar to the average home refrigerator showed a slight decrease after holding periods of 15 and 30 days. The loss is approximately 2½ percent which cannot be considered serious.

STUDIES OF FOOD FOR THE FARM FAMILY

A well fed family feels better and can do better work. Being well fed involves more than a supply of food. It involves caring for and preparing food so that it will be palatable and so that minerals and vitamins will be conserved. The Home Economics Department has centered its efforts this year on studies of this kind.

Food Preparation for Different Groups

A study is now in progress of methods of preparing food used by white and negro homemakers in small towns of the Delta and Shortleaf Pine Areas. There is little, if any, difference in methods of preparation that can be attributed to area, but families in the different economic groups prepare foods differently.

Less well-to-do families. This is the group where frying of food and long cooking of food is most prevalent. Soda, vinegar, and other ingredients are frequently added to make foods tender and shorten the time of cooking. Milk and eggs are used less in making bread than by groups with higher incomes, cornbread is more often hot water bread, and biscuit is more often made with water and self-rising flour. Salads are seldom served, and when served, are generally seasoned with a vinegar, sugar, and salt dressing More new dishes tried are new foods rather than combinations of old foods. This may be one reason why many of the new dishes tried by these homemakers are disliked by their families, as a new flavor rather than a new combination is involved.

Some possibilities for improving food preparation include: (1) more general use of "pan broiling" vegetables (cooking in a covered skillet a short time in a small amount of fat and water); (2) increased use of raw leafy vegetables and fruits in the form in which they come from the garden, orchard, or market; that is, no extra preparation, such as cutting, chopping, adding dressing, etc.; (3) combining unfamiliar greens, such as spinach, beet tops, kale, and swiss chard with familiar greens, such as turnip greens, collards, and mustard; (4) developing better recipes for soups and stews in which canned tomatoes are used.

Families of average economic status. This is the group in which homemakers try out many ways of cooking familiar foods. Homemakers in this average group try many new desserts; tomato juice for breakfast and raw vegetables and fruits with salad dressing and mayonnaise are served by a number.

Families of the well-to-do group. These homemakers are more likely to purchase new foods than are those in other groups.

Broccoli in some form was the new dish tried by families in this group more often than any other dish during the past year. Salads are used more than desserts. Roasting and broiling of meat, buttering and creaming of vegetables, French dressing on salad, are much more frequently used than in other economic groups.

Influence of friends. "Friends" is the most important single factor leading homemakers in all economic groups to try new dishes. The influence of white people is an especially important factor with negro homemakers, though not as important as their own friends.

Vitamin Studies on Vegetables

The Southern Cooperative Studies in which this department is participating, are a part of the National Cooperative Experiment Station Project on "Conservation of the Nutritive Value of Foods." The project was planned as both a wartime and a peacetime project. Little is known about what happens to the nutritive value of most foods from the time of harvest until they are eaten. Many processes to which food is subjected affect its nutritive value. The Southern Cooperative Studies have included the effects of storage and cooking, as well as the effects of variety, maturity, and nitrogen fertilization on the vitamin C content of vegetables.

Turnip Greens

The work on turnip greens has been continued and expanded. Four varieties of turnip greens—Shogoin, Seven Top, Pomeranian White Globe, and Purple Top Globe—were grown in the spring and in the fall at two levels of nitrogen and harvested at three stages of maturity. Significant differences due to variety, maturity, and storage were found. On the moisture free basis the vitamin C content was highest in Shogoin, next highest in Seven Top, and lowest in Purple Globe and Pomeranian. The last two varieties contained about the same amount of vitamin C. The more mature greens, or those from the second harvest, contained more vitamin C than the young greens.

The greens were stored in the room and in the refrigerator for 24 and 48 hours. The room-stored greens were, however, put in the refrigerator at 6 p. m. and taken out at 8 a. m. the following morning, as is usually done in the grocery store. Refrigerator storage for 24 hours caused little or no loss of vitamin C, and storage for 48 hours a maximum loss of 21.5 percent. Greens stored in the room, however, lost from 23 to 43 percent of their vitamin C after 24 hours, and 27 to 60 percent after 48 hours.

Greens from the second harvest lost less vitamin C than did those from the first harvest (young greens). Shogoin greens lost the least vitamin C, followed by Pomeranian, Seven Top, and Purple Top, arranged in the order of losses.

Lima Beans

Two varieties of lima beans, a pole variety (Carolina Sieva), and a bush variety (Henderson Bush), were grown and harvested at two stages of maturity. Vitamin C losses were determined on both stored and cooked beans. The green pole beans grown in Mississippi contained 23 percent more vitamin C than did the bush beans, but there was little difference in the vitamin C content of the two varieties of mature beans. The green beans of both varieties were twice as rich in vitamin C as the mature beans.

Storage. Shelled beans were stored in the room and in the refrigerator for 48 hours, and beans in the pod for 96 hours. The room-stored beans, both shelled and in the pod, lost from one and a half to over five times more vitamin C than those stored in the refrigerator. Beans stored in the pod lost less vitamin C than the shelled stored beans, and the mature beans lost a higher percentage of their

vitamin C than did the green beans.

Cooking. Cooking for ½ hour was much less destructive of vitamin C than cooking for 3 hours. Cooking losses were much greater for the mature beans than for the green beans, and for the stored than for the unstored beans. Those stored in the refrigerator lost less vitamin C when cooked than those stored in the room.

HORTICULTURAL PROBLEMS ON FARMS OF MISSISSIPPI

Fruit Investigations

Additional varieties of peaches and plums were added to the stone fruit testing orchard, where there are now well over 100 varieties of peaches and about 70 varieties of plums under observation. As a result of the limited freezing and dehydration tests conducted during 1943, the merits of more than a dozen varieties of peaches were evaluated. Elberta and Early Elberta ranked at the top of the list for freezing and dehydration. Apple and plum seedlings resulting from previous crosses are growing in the nursery. Over 1500 plum flowers were pollinated during the spring of 1944, an encouraging proportion of which set fruit.

The apple crop was light in 1943, but many varieties will fruit for the first time in 1944. Several selections from a collection of apple seedlings picked up over Mississippi continued to perform favorably, namely, Eckles, Kosciusko, Nos. 361, 363, and 364. Red Rowden again showed up well, while Melba bears promise of being an excellent early apple for cooking and eating in the fresh state. Practically all pear varieties of bearing age have set a good crop of fruit in 1944.

The peach fertilization project was established during the winter at Poplarville by setting out nematode-resistant rootstocks budded to the Georgia Belle variety. Growth measurements were tabulated from test trees at Stoneville and Crystal Springs, where the project has been in progress for 2 years. Low temperatures in the spring followed by a protracted drouth in the summer so reduced the crop that it was not considered advisable to take yield records from any of the fertilized plots in 1943. The proper fertilizer materials have been applied and this year's crop looks promising.

Grape vines of the Concord and Delaware varieties in the pruning, thinning, and fertilization project were too young to produce a measurable crop during 1943. These vines have been differentially treated during 1944 and will produce a crop subject to analysis. Linear vine growth has been excellent as a result of the vigor of the Dog Ridge rootstock.

Vegetable Investigations

Sweetpotatoes. The work on sweetpotatoes in 1943 included preliminary tests of 78 seedlings at Stoneville, 38 at Ellisville, and 324 at State College. There were two seedlings selected for increase and yield, and cooking trials because they appeared superior to standard varieties for food use. One new seedling was selected for starch because of its high percentage of starch at three locations. Four selected table varieties were tested for vacuum canning and one new one appears superior to yellow varieties now available for that purpose.

The work also included the measuring of the yield, grade, and starch content of seven tillage treatments. Small and inconsistent differences were observed, although in 1943 greater yields were observed on plots receiving the minimum amount of land preparation, namely, middlebusted and re-middlebusted. At Ellisville, a test of the so-called "twin-row" method of growing sweetpotatoes showed that yields were as good, but no better than, those obtained by the conventional single-row method.

Tests were continued at State College of the effect of high and low levels of nitrogen fertilizers in producing seed sweetpotatoes upon their keeping qual-

Figure 3. Trailing cart 2-row transplanter. A. Barrels set on end. B. Barrels horizontal and connected, giving a uniform water flow.

ities and sprouting abilities. The results show that nitrogen in the fertilizer had no effect upon keeping or sprouting. Time of harvest, when delayed until after a freeze which killed all vines, affected seriously the keeping of the potatoes and therefore total sprout production. This test has been conducted for four years, and the results are being prepared for publication in cooperation with other Stations and the U. S. Department of Agriculture.

During the past storage season three strengths of a commercial wax emulsion were tested as aids to keeping sweetpotatoes. The appearance of the sweetpotatoes was improved considerably by washing and waxing, but losses in weight and from decay were variable and too small to be of any significance.

Tests of 20 fertilizer treatments for starch sweetpotatoes were continued in 1943 at Ellisville. Results show that an application of 750 pounds to the acre of 6-8-4, plus a top dressing of 100 pounds to the acre of a mixture of equal parts of 16 percent superphosphate and 50 percent muriate of potash, should be the most profitable for Triumph sweetpotatoes grown for starch on old lands of South Mississippi.

In 1943 and in 1944, work was continued cooperatively with the U. S. Department of Agriculture in testing and evaluating machinery in the production of sweetpotatoes. This department is cooperating in the designing and testing of transplanters, vine removal equipment, harvesting and hauling equipment.

In 1944 there was planted at State College preliminary yield tests of 58 seedlings and varieties, and observation tests of 115 seedlings and varieties, together with 1000 seedlings grown from true seed supplied by Dr. J. C. Miller of Louisiana State University. At Ellisville are planted 25 table and 25 starch varieties for studies of yields, grades, carotene or starch content, disease resistance and quality. The Department is growing increases of several prospective starch varieties for cooperative laboratory and pilot plant tests by the Southern Research Laboratory.

Tomatoes. In the fall of 1943 studies of 10 tomato varieties were continued, but on account of late planting and an early frost no yield data were obtained. In 1944 the variety and selection work has been continued by planting 10 varieties at State College, Poplarville, Crystal Springs, and Stoneville. There have also been planted for preliminary observation and selection 23 un-named selections obtained from breeders of the U. S. Department of Agriculture at Beltsville, Maryland, and Charleston, South Carolina. Many of these selections are from hybrids of the wilt, leaf mold, and collar rot resistant varieties or the wilt resistant Peruvian species.

Snap Beans. In 1943 a fall planting was made of selected bush bean lines obtained from the U. S. Vegetable Breeding Laboratory. Most of these lines failed to mature seed because of an early frost, but seed were saved from 104 of the approximately 200 lines planted. In 1944, 21 new lines were obtained from the Laboratory, and these were planted along with the 1943 selections and 4 standard commercial varieties. Individual plant selections will be made in these segregating lines, and the seed will be planted in the fall for further observation and selection. There have been obtained in 1944 also 32 lines of pole beans produced by breeders of the Virginia Experiment Station and selected for rust resistance. These have been planted along with the Kentucky Wonder variety for preliminary observations on adaptability, rust resistance, and quality.

Cucumbers. In continuing the pickling cucumber breeding work, selfed seed were produced in 1943 on 30 hybrids and varieties. Selections in six station-produced hybrids were selfed in the sixth generation, two in the third generation, and two new crosses were made.

In further evaluation of fertilizers for pickling cucumbers, a test has been planted at Poplarville to measure the effects on yield grade and nematode control of various rates of nitrogen from two different sources, in connection with a complete fertilizer.

Irish potatoes. The selection work with potatoes has been continued with the cooperation of the U. S. Department of Agriculture. Fifty-seven new seedlings were planted in 1944, along with

the 5 selections made in 1942 and the 7 made in 1943 in U. S. D. A. lines. These have been planted alongside Triumph and Katahdin, and selection will be made on the basis of comparison with these as to earliness and production. All of the material furnished by the U. S. Department of Agriculture has been selected for resistance to mosaic disease.

Sweet corn. The work started in 1943 with sweet corn in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering, has been enlarged to include variety testing and a study of planting time and hill spacing. In 1944 there are 19 varieties planted at State College, Stoneville, and Poplarville for tests of yield, earliness, corn earworm susceptibility, and quality. There are planted at State College two varieties at six different times and four different hill spacings for tests of earliness, yield, corn earworm susceptibility, and quality.

It is too early in the season for any harvesting results to be given in this report, but data at hand show that there is a possibility that sweet corn can be marketed from southern Mississippi by June 1 under certain conditions of variety and planting time. Sweet corn of good quality should be very profitable to growers if marketed at that time.

Flower Investigations

Azaleas. In the study of the effect of cold storage and light upon the early flowering of azaleas, six varieties of potted azaleas subjected to 40 degrees Fahrenheit for 4 weeks beginning October 1 and grown in the greenhouse at 60 degrees to 65 degrees Fahrenheit following cold storage treatment, bloomed approximately 2 weeks to 5 weeks earlier with more blooms opening at one time than plants not subjected to cold storage treatment. Of the varieties used, namely: Coral Bells, Christmas Cheer, Hexe, Hinodegiri, Snow, and Formosa; Coral Bells bloomed earlier than other varieties subjected to cold storage treatment.

Plants given 10 hours photoperiod daily with 40-watt Mazda lamps while in cold storage defoliated slightly. Varieties Coral Bells, Snow, Hinodegiri, and Hexe placed in darkness during the cold storage period showed severe defoliation in the case of Hinodegiri and Snow varieties, with somewhat less defoliation resulting in varieties Hexe and Coral Bells.

PLANT DISEASES: THEIR NATURE, CAUSE, AND CONTROL

In our warm and humid climates, destructive epidemics of plant diseases are of frequent occurrence. These epidemics, when associated with unusual weather conditions, frequently result in local crop failures. Such losses affect the economic life of the community and the individual grower to a greater or lesser degree depending upon the diversification of the agriculture practiced by the individual, the community, or the state.

During the past spring considerable rainfall occurred over Mississippi and adjoining states. As a result, three natural events followed which seriously affected several important crops in the State.

First: The late blight disease of Irish potato, caused by the parasitic fungus **Phytophthora infestans,** invaded the potato fields of Walthall and adjacent counties, destroying several thousand acres of plants shortly before harvest. The disease migrated northward and was later found on home-grown potatoes throughout the State. The same disease moved from Irish potatoes to tomatoes in the Hazlehurst and Crystal Springs area, destroying the lower clusters of early maturing plants. The tomato crop was reduced approximately one-third by this and similar diseases attacking the fruits, stems, and leaves. These diseases have appeared later on tomato plants in home gardens in other parts of the State.

Second: Prolonged wet weather in the early part of the year delayed the planting and maturing of many crops until warmer weather. Under such conditions

the parasitic soil borne fungus, **Sclerotium rolfsii,** became epidemic on vegetables and legumes of many kinds. It was especially responsible for the failure of Irish potatoes to keep, for the skips in peanut fields, and for the failure of lespedeza, beans, tomatoes, and melons.

Third: Cotton and corn, planted later than normal, suffered less from damping-off than usual. Some difficulty is always encountered in obtaining good stands of cotton and corn if these crops are planted early or if they are subjected to cool weather after planting. As a general rule, early planting gives better yields if too much trouble is not encountered in obtaining stands of plants.

Mississippi Experiment Station Circular 105 gives directions for improving the stand of many kinds of plants by the prevention of seedling diseases. The information contained in this circular is designed to conserve seed and to improve stands and yields of many vegetable and field crops. Experiment Station Circular 114 contains information on the control of several vegetable diseases. Unfortunately almost no useful information is available on the control of the soil borne parasite, **Sclerotium rolfsii,** which causes Southern Stem Blight.

Although the development of plant disease epidemics is frequently related directly to weather conditions, this is not always true. Soil borne diseases such as cotton wilt, root-knot, tomato wilt, and similar disorders are present in some soils the year around, and weather conditions affect them but slightly. Similarily, seed borne pathogens such as those causing bean blight, tomato fruit spot, potato degeneration, sweetpotato black rot, gladiolus neck rot, and other similar troubles are carried in the seed or seed pieces and are not affected by weather conditions to any important degree. Special measures designed to prevent or control these diseases must be worked out for each crop and for each climatic region or area in which the crop is grown.

During the past year the Department of Plant Pathology, in cooperation with the U. S. Department of Agriculture, the State Plant Board, and the several Branch Experiment Stations and departments of the Experiment Station, has investigated the following disease problems confronting Mississippi farmers.

Better methods of preventing damping-off in cotton seedlings were sought. Several new cottonseed dust disinfectants were tested under field conditions representing four separate regions of the State. Organic-mercury dusts proved to be highly satisfactory for improving seedling emergence and yield of cotton.

Several new sweetpotato seed-piece disinfectants were investigated with the hope that improvements could be made in the well-known corrosive sublimate soak. A new product consisting of aromatic phenolphenols and hydroxy-nitrocresols was tested and found to be an effective sweetpotato seed-piece disinfectant. Further tests are under way on this material, which has the advantage of not being easily precipitated by metals, clays, and organic materials. Corrosive sublimate quickly loses its disinfecting power under similar conditions. It also attacks and destroys metal containers.

Control of the root-knot and meadow nematode in garden soil by means of a chemical disinfectant was accomplished experimentally last year. Using a mixture of propane dichlorides as a soil fumigant, both species of plant parasitic nematodes were effectively controlled. Further investigations of a very limited nature are under way. Experiment Station Circular 104 contains general information on the control of root-knot in home gardens. This pest has been found in approximately 80 percent of the counties of Mississippi. It attacks more than 1000 kinds of plants and weeds, and it is one of the most common pests in home gardens and flower beds. The root-knot nematode does not seriously attack grasses and cereals, although the meadow

Figure 4. Plant diseases, like human diseases, sometimes become epidemic and cause much loss and destruction. They can seldom be cured but oftentimes they are easily prevented. (Pod-spot of lima beans caused by the parasitic fungus Diaporthe phaseolorum.) Use certified or disease free seed, practice sanitation, rotation, and fertilization.

nematode will do so under some conditions. Recent reports from Virginia indicate that this nematode is partly responsible for the degeneration of box plants, a disease which is difficult to diagnose correctly.

The watermelon wilt disease has been a serious limitation to the production of this crop in Mississippi. The disease is caused by a soil borne fungus which invades the fields the second year watermelons are grown on the same soil. Because this pest will remain in a soil for eight or more years, watermelons must be planted on new ground if trouble is to be avoided. Disease resistant varieties of watermelons have been developed by California and Iowa for their conditions, and while these types of melons will grow in Mississippi on disease infested soils the quality of the fruit is inferior to the Dixie Queen and similar disease-susceptible varieties. The Experiment Station in cooperation with the Experimental Tung Field Station at Poplarville has developed a few strains of melons which seem to be suitable for our conditions. Because it requires five or six generations or years to fix the character of a melon, seed is not yet ready for distribution. Several off-type strains are being eliminated from the better selections.

Cotton wilt is a disease similar to watermelon wilt. This trouble, common on sandy soils, is also being investigated both in the laboratory and in the field. Several resistant varieties of cotton are available for the control of wilt. These are strains of Rowden, Clevewilt, Miller, Cook, Cleveland, Delfos 425, D. and P.

L. 11A, strains of Coker and Coker Wilds. The choice of a wilt resistant variety depends largely on its adaptability to the area in which it is to be grown Experiments have recently been completed which indicate that ordinary varieties may be successfully grown on wilty soils if heavy quantities of manure or leguminous cover crops are turned under in such a way that the bulk of the organic matter is buried immediately under the future cotton row. Broadcasting the manure or flat-breaking the cover crop does not appear to be effective. Ten or more tons of manure or legume cover crop per acre drilled under the cotton beds seems to be necessary for desirable results.

RESEARCH FINDINGS AID MISSISSIPPI POULTRYMEN

Construction and Use of Feed Hoppers

In June 1943, Experiment Station Circular 109 was published giving approximate cost, construction details, and bill of materials for feed hoppers. These hoppers were designed to feed chickens during the brooding and broiler age, growing age, and laying age. Special emphasis was given to sanitation, labor saving, and the prevention of feed waste. These hoppers were designed and used under feeding trials on the poultry farms over a period of several years to test the merits of each to meet the requirements of a good feed hopper.

Gas Equipment for Brooding Chicks

Chicks have been brooded successfully in batteries and under pen conditions on the Station farm with natural gas. A No. 3 gas burner set inside a gallon bucket, and equipped with a thermostat was found to be a dependable and economical method of heating chicks. Its first cost is reasonable, and depreciation low after several years of use.

A No. 1 gas burner surrounded by a tin shell, and equipped with a deflector gave very good results for brooding chicks in batteries in a room not preheated. As in the case of pen brooding, the depreciation was very low over a period of 5 years' use.

Figure 5. Producing eggs to supply war needs. Shown in the foreground the outdoor feed hopper described.

Common Grasses, Legumes for Vitamin A

This project was started in the fall of 1944 and has included approximately 60 white Leghorn pullets 9 weeks of age, divided into 2 lots for each series. Three series of pullets have been grown to laying age in the spring, three in the fall, and two in the summer. The third group of the summer series are now 16 weeks of age, and when carried until their egg yolks are depleted of vitamin A this phase of the project will be completed.

The amount of carotene stored by the pullets depended on the availability of succulent grasses and legumes for grazing. Birds grown in the fall season stored more carotene than birds grown in the spring or summer season. Pullets placed on range in March had access to a greater variety of grasses and legumes, but these crops did not last long enough for the birds to store large amounts of carotene before the outset of egg production. Little difference was noted in average weight between birds grown on an adequate vitamin A and a deficient vitamin A ration, by seasons and by series. This difference was 2.2 ounces for all lots and series.

The pullets housed on the vitamin A deficient ration laid less eggs than those housed on a ration adequate in vitamin A.

Kudzu in the Ration of Growing Chicks

It has been very difficult to obtain alfalfa meal during the past 2 years for feeding poultry. Since kudzu can be grown in sections not adapted to the growing of alfalfa, a test was begun in the fall of 1943 to determine the value of kudzu for replacing alfalfa in the chick ration.

Methods of sun curing kudzu have

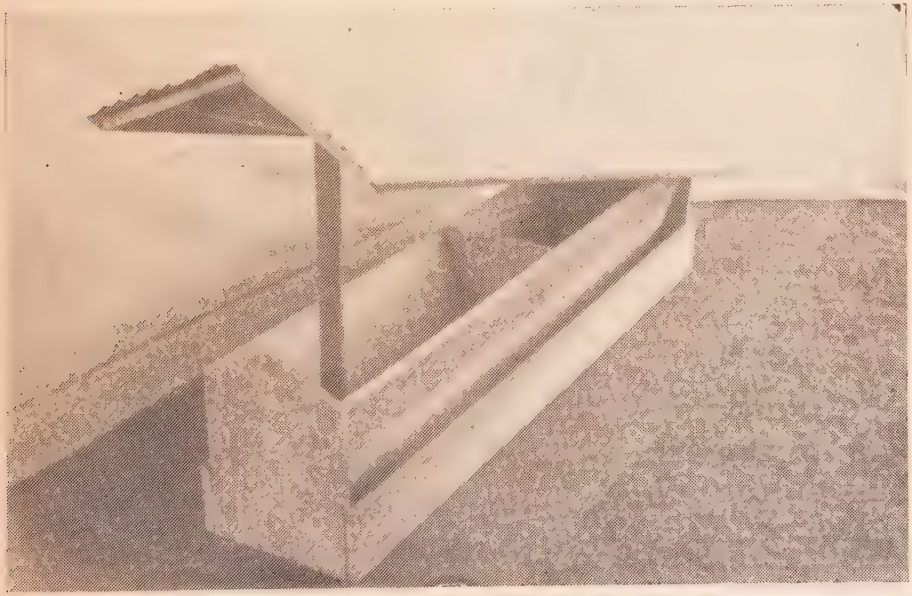

Figure 6. Outdoor feeder, for growing birds from 6 weeks to laying age. Top raised to show construction.

been studied, and chemical analysis made of kudzu leaf meal and kudzu meal. Kudzu meal is similar to alfalfa meal in content of fiber, protein, calcium, phosphorus, vitamin A, and riboflavin.

The rations are calculated to test the availability of vitamin A and riboflavin in the kudzu. All rations are similar with the exception of kudzu. Ration 1 carries 9 pounds sun-cured alfalfa; ration 2, 19 pounds of kudzu leaf meal; ration 3, 10 pounds kudzu meal; and ration 4, 10 pounds kudzu meal without dried milk.

Four lots of 40 hybrid chicks (Barred Plymouth Rock males and white Leghorn females) were used. The weights on one series of chicks grown in the winter of 1943-1944 to 9 weeks of age are:

Lot 1. Alfalfa meal, 30.77 ounces.
Lot 2. Kudzu leaf meal (9 lbs.), 28.65 ounces.
Lot 3. Kudzu meal (10 lbs.), 28.65 ounces.
Lot 4. Kudzu meal (10 lbs. without milk), 30.32 ounces.

The mortality did not exceed 10 percent on any of the lots.

Watering Equipment for Poultry

Experiment Station Circular 119 carries watering equipment generally used for chicks, growing birds, and laying hens. Special emphasis has been given to an adequate water supply, sanitation, and labor saving devices. A detailed description of the various watering systems as to use and construction is given in Circular 119.

ZOOLOGY AND ENTOMOLOGY: CONTROL OF INSECT PESTS

Control of Insects in Stored Corn

Tests in weevil control by fumigation of farm cribs lined with asphalted felt at low cost were continued in 1943 with very satisfactory results. The lining material will apparently last several years. Many examinations of corn for weevil resistance indicate that weevil damage in the field may be reduced through breeding. This will be investigated in more detail in 1944.

Cucumber and Melon Insects

Field tests for the control of the pickle worm in cantaloupes indicated that semi-

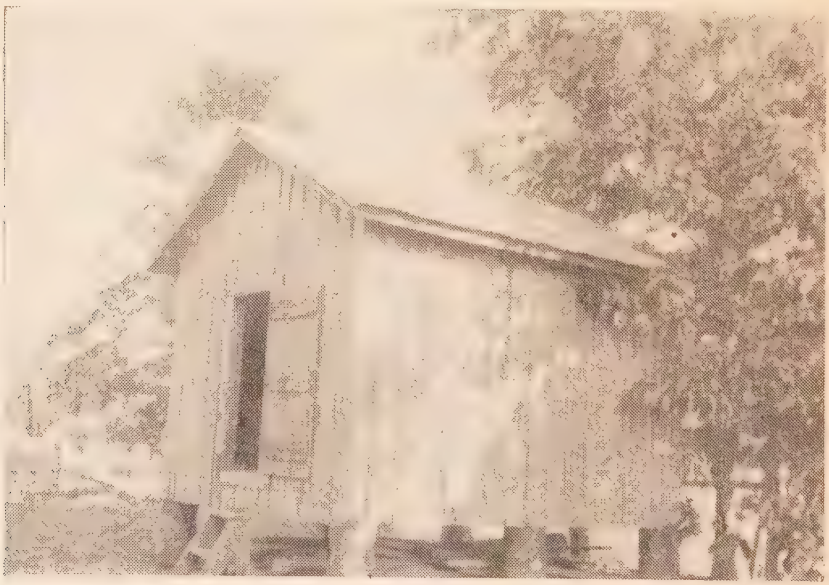

Figure 7. Exterior view of a desirable crib for lining. This crib was ceiled.

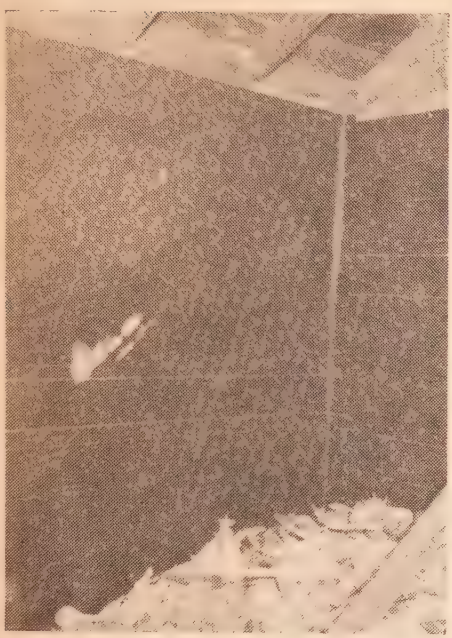

Figure 8. Interior view of crib after lining.

weekly applications of cube or derris dust containing ½ percent rotenone gave good control of this pest. A mixture containing 30 percent cryolite, 6 percent Cuprocide, and 64 percent talc applied weekly was equally effective and cost considerably less than the rotenone dust.

Boll Weevil Control

Tests in 1943 indicated that in years when the weevil infestation does not exceed 30 to 40 percent, nearly all the increase from poisoning is due to protection of bolls. Usually the critical time for boll protection is when weevils begin migrating about August 1. It seems evident that dusting should not start until cotton has been blooming for at least a week and the infestation has reached 25 percent.

Bees in Relation to Clover

White clover under cages screened from bees and other insects of that size or larger did not set any seed, while clover heads outside the cages averaged more than 170 seeds per head. The operation of an apiary on a clover-seed producing farm was profitable in increasing the yield of clover seed and in the production of honey.

DELTA BRANCH STATION REPORTS MANY ACTIVITIES

The Delta Branch Station has continued to adapt its program not only to war demands, but also to the general war conditions. Deterioration in the supply and quality of labor has been pronounced, if not more so, for station operation than for general plantation operations. The Station has operated this cropping season with less than 50 percent of the regular labor had in 1943.

HYBRID CORN AND SMALL GRAIN TESTS

Hybrid Corn Test

Eleven hybrids and 14 open-pollinated varieties of corn were compared at the Delta Branch Station in 1943.

Yields in bushels per acre are given in tabular form. Among all varieties tested, 10 of the hybrids ranked in the top 11 for yield. All open-pollinated varieties ranked twelfth or below, except Jellicorse, which was third. Deficiency of moisture, especially during the early part of the season, may account for the rather outstanding performance of the hybrids as compared with open-pollinated varieties.

Corn Spacing-Fertilizer Test

Four varieties were planted at four different production levels; these were one, two, three, and four plants per hill, checked at 40 inches in each direction.

Each variety and population combination was grown on each of four levels of nitrogen: 20, 40, 60, and 80 pounds of nitrogen per acre, or the equivalent of 125, 250, 375, and 500 pounds, respectively, of 16 percent nitrogen fertilizer per acre.

All varieties made their highest yields on the four-plant-per-hill population, ex-

Table 1. Hybrid corn test: Stoneville[1/]

Rank	Variety	Yield[2/] (Bushels per acre)
1	Funk's G717	65.9
2	Louisiana Hybrid 468	60.3
3	*Jellicorse	60.2
4	Tennessee Hybrid 15	58.8
5	Louisiana Hybrid 173A	58.6
6	Funk's G703	58.4
7	Tennessee Hybrid 14	57.0
8	Louisiana Hybrid 123	54.4
9	Funk's G713	53.9
10	Louisiana Hybrid 3802	53.5
11	Tennessee Hybrid 10	52.6
12	*Mosby	52.6
13	*Laguna	51.3
14	*Whatley Prolific	49.0
15	*Hastings' Prolific	47.8
16	*Surcropper	47.5
17	*Indian Chief	47.3
18	*Hastings' Yellow Prolific	46.9
19	*Neal Paymaster	45.6
20	Florida Hybrid W-1	45.0
21	*Cock's Prolific	43.4
22	*Florident Yellow	40.1
23	*Golden Dent (Hastings')	38.7
24	*Florident White	35.8
25	*Huffman	27.0

1/Planted April 6, 1943. Harvested November 20, 1943.

2/A difference in yield of 6.6 bushels between varieties is necessary for significance.

*Open-pollinated varieties.

cept College White Mosby, which was highest on the three-plant-per-hill population. The average yield of 76.4 bushels per acre for two plants per hill is about 25 percent more than the yield of one plant per hill of 61.2 bushels per acre. Further increase in yield was made as the population was increased up to four plants per hill, but the amount of increase was less in proportion to population increase. Four-plants-per-hill average yield of 84.0 bushels per acre is highly significant as compared with two-plants-per-hill population.

The fertilizer was applied as a side dressing when the corn was about 8 inches high. It was placed about 2 inches to the side of the hills to a depth of 1-1/2 inches. There was no response to different rates of nitrogen, probably because the plant food supplied by the fertilizers did not become available under drought conditions.

There was apparently a difference in the way in which the varieties responded to increased population. Also, there was a significant difference between variety yields.

Variety Tests of Small Grains

Good seed that is free of weeds and variety mixing is more important than the variety used, as long as it is one of the higher yielding varieties. The farmer's best insurance against poor seed is in buying only state certified seed.

Victorgrain, Stanton, and the Red Rustproof varieties have been giving the highest yields at the Delta Station, as indicated in table 2. Victorgrain and Stanton are about 1 week earlier than the Red Rustproof varieties. At present, Delta Red, Delta Red 88, and Nortex are the only Red Rustproof varieties of which certified seed are available.

All seed oats should be treated for smut. For detailed instructions on seed treatment, see an article on oat diseases by J. A. Pinckard in Mississippi Farm Research, August 1943.

Table 2. Oat variety test: Stoneville, 1943.

Variety	Maturity	Yield (Bu. per a.)
Victorgrain Strain 3	Med.	61.0
Hastings' 100 Bushel	Late	59.7
Victorgrain Strain 42-3	Med.	56.4
Victorgrain	Med.	56.4
Delta Red 88	Late	54.5
Ferguson 922	Late	54.5
Ranger	Late	54.4
Delta Red	Late	52.4
Stanton Strain 1	Med.	52.0
New Nortex	Late	46.8
Fultex	Med.	46.5
Fulgrain Strain 6	Early	43.7
Fulgrain Strain 3	Early	37.1
Kanota	Early	24.0
Fulton	Early	*—

*Winter killed in 1943.

A difference of 11.0 bushels per acre is necessary for significance between varieties for 1943.

Table 3 gives the yield in bushels per acre of seven varieties of barley that

were tested in 1943. Wintex and Texan have been making very good yields at the Delta Station for the past several years. Both varieties can be recommended for grain, but only Texan should be recommended for grazing when mature. Wintex, because of the rough beards, is objectionable if grazed when mature.

Table 3. Barley variety test: Stoneville, 1943.

Variety	Yield (Bu. per acre)
Texan	34.6
Wintex	34.0
Reno	33.8
Finley	30.4
Wang	25.6
Maryland No Barb	24.4
Missouri Early Beardless	22.3

A difference of 5.4 bushels per acre is necessary for significance between varieties.

In table 4 are the yields in bushels per acre of eight wheat varieties tested in 1943. Hardired Strain 3 made a yield of 22.5 bushels per acre, which was significantly above all other varieties in the test.

Table 4. Wheat variety test: Stoneville, 1943.

Variety	Yield (Bu. per acre)
Hardired Strain 3	22.5
Texas Sel. No. 41-16-3-3	19.5
Tennarq	19.2
Sanford	19.1
Fulcaster	18.9
Purplestraw	15.9
Redhart Strain 5	13.9
Red May	12.7

A difference of 1.0 bushel per acre is necessary for significance between varieties.

SOYBEAN TESTS

The Southern Regional Soybean project was initiated in 1943. With headquarters at the Delta Station, tests are conducted in 12 Southern or Southeastern States, principally in cooperation with the State experiment stations. The studies conducted at the Delta Station include not only testing of varieties brought in from other sections of the country to determine adaptation to local conditions, but also most of the breeding work for the Southern area.

Variety Testing

When classified according to maturity, the S-100 variety, developed at the Missouri Station, gave the highest yield for varieties maturing on or before September 15. Seed are not, however, commercially available. Of those early-maturing for which seed are readily available, Macoupin gave the best yield, 19.7 bushels per acre.

A larger number of varieties maturing from September 16 to October 15 were available for testing. Ogden led the group with a yield of 38.5 bushels. Delsoy (formerly called Edsoy), an edible bean selected by the Delta Station, was second with 34.9 bushels per acre, with Arksoy 2913 yielding 31.8 bushels, and Ralsoy 30.0 bushels, respectively.

There was a wide variation in yields for varieties maturing after October 16, the range being from 10 bushels per acre for Biloxi to 53.5 for Volstate. Other high yielding varieties were Wood's Yellow, 46.5 bushels; Tennessee Non-Pop, 45.4; and Tokyo, 39.8 bushels per acre.

There is quite a variation in the tendency for soybeans to shatter, so this character has to be considered along with other factors. Ogden and Volstate have relatively high oil contents, along with Macoupin, Mamredo, and Arksoy 2913, the range being from 21.7 to 19.9 percent.

Edible Soybeans

A large number of varieties were tested. Among those for which 9 years' data are available, Nanda, Chame, and the Delta Station Delsoy were high yielders. Nanda 101, tested for only the past 3 years, led with 45.4 bushels per acre, with Delsoy yielding 29.6 bushels and the others giving intermediate yields.

SOIL FERTILITY INVESTIGATIONS

Inasmuch as nitrogen is the plant nutrient most generally required by Delta

soils for profitable crop production, the soil fertility investigations at the Delta Station are designed to determine the most profitable means of supplying the needed nitrogen. These experiments are conducted on both the heavy clay and sandy loam soil types. On the heavy clay or "buckshot" soils, methods of improving the physical condition of the soil, as well as supplying nitrogen, are being studied.

The nitrogen required for profitable crop production may be supplied by commercial nitrogen, winter legumes, or summer legumes. In addition to the nitrogen investigations, experiments are conducted to determine the deficiencies of other plant nutrients.

Nitrogen for Delta Soils

Commercial nitrogen. Experiments on sources and rates of applying nitrogen for cotton and corn have been conducted for the past 23 years, and the same experiments on oats have been conducted for 16 years. Experiments comparing fall applications with spring applications of nitrogen for cotton, corn and oats have been investigated since 1937. Results of the experiments are shown in table 5.

The results of the rates of applying nitrogen experiment with cotton, corn, and oats show that profitable increases are obtained when 45 pounds of nitrogen are applied per acre; however, the 30-pound application shows the greater profit per dollar invested in fertilizer. In general, the results of the time of applying nitrogen experiment show spring applications to be slightly superior to fall applications.

The results of an experiment on corn which compares the effectiveness of deep application (8 to 12 inches below the seed) of nitrogen with the ordinary method of application, indicate that nitrogen should be applied deeper than is ordinarily done in order to obtain maximum corn yields.

Table 5. Commercial nitrogen for cotton, corn and oats: Stoneville.

Treatment	Average yield per acre		
	Cotton 23 years	Corn 23 years	Oats 16 years
A. Sources of nitrogen*			
No treatment	1191	23.5	21.6
Sodium nitrate	1694	38.7	59.6
Ammonium nitrate	1681	40.2	57.5
Ammonium sulfate	1624	37.5	52.4
Cyanamid	1606	37.1	45.5
Cottonseed meal	1556	33.0	35.3
½ cottonseed meal, ½ sodium nitrate	1612	34.3	46.0
B. Rates of applying nitrogen			
No treatment	1121	23.4	20.5
7½ pounds	1249	26.7	30.3
15 pounds	1361	31.3	41.9
22½ pounds	1499	35.1	48.9
30 pounds	1634	39.7	56.4
37½ pounds	1715	41.9	60.0
45 pounds	1755	43.7	62.2
C. Time of applying nitrogen*			
No treatment	1012	24.5	21.6
Sodium nitrate—fall	1491	40.9	49.3
Ammonium sulfate—fall	1509	41.0	47.2
Cyanamid—fall	1533	38.8	44.8
Sodium nitrate—spring	1514	40.6	56.9
Ammonium sulfate—spring	1579	41.3	54.6
Cyanamid—spring	1613	41.0	43.7

*Nitrogen applied at the rate of 30 pounds per acre.

Legumes. The practice of growing and turning under winter legumes has proved to be a very profitable means of supplying nitrogen for cotton production. Summer legumes interplanted with corn have produced increases in yields of corn larger than the increase produced by 30 pounds of commercial nitrogen; and the yields of seed cotton, in a rotation (consisting of corn interplanted with summer legumes, and cotton) have been greatly increased following corn interplanted with summer legumes. In an experiment on "buckshot" soil, the largest yield of seed cotton has been obtained following the turning of soybeans.

The 14-year results of an experiment comparing the influence various winter legumes with a 30-pound application of commercial nitrogen has on the yield of seed cotton are as follows:

Treatment	14 yr. av. yield of seed cotton
No nitrogen	996
30 pounds commercial nitrogen	1362
Austrian peas	1366
Hairy vetch	1656
Giant bur clover	2125*
California bur clover	1735**

*Average for last 4 years only.
**Average for last 11 years only.

Experiments comparing the effectiveness of several varieties of winter clovers and vetches in supplying nitrogen for cotton were begun in 1941. The 3-year average yield of seed cotton following the varieties of clovers and vetches, and the yield in green weight per acre of the clovers and vetches, for 1944 are as follows:

Treatment	3 yr. av. yield seed cotton	Green wt. of cover crop 1944
Vetch test		
No nitrogen	1108	——
30 pounds commercial N.	1509	——
Austrian peas	1194	10164*
Hairy vetch	1688	11024
Hungarian vetch	1428	8927
Common vetch	1490	7690
Mixed vetch	1590	14305**
Williamette vetch	1608	11562
Alba vetch	1608	6776
Hairy vetch—grazed	1537	11024
Hairy vetch, 20 pounds N.	1686	10271
Clover test		
No nitrogen	1247	——
30 pounds commercial N.	1457	——
Hairy vetch	1499	7824
Giant bur clover	1710	26350
Manganese bur clover	1667	29980
California bur clover	1593	11454
Alsike clover	1376	——*
Crimson clover	1448	11508
Red clover	1289	——*
White Dutch clover	1476	——*

*Weight produced by wild winter peas. Austrian peas killed by disease.
**Contains over 50 percent hairy vetch.
*These clovers did not produce enough green material to take weights.

In a commercial fertilizer and winter legume alternation experiment, winter legumes every year have produced an average of 1588 pounds of seed cotton. Winter legumes one year with 30 pounds of commercial nitrogen the next have produced the next highest yield of 1570 pounds of seed cotton. The plot receiving 30 pounds of commercial nitrogen every year has averaged 1432, while the no nitrogen plot has yielded 1037 pounds of seed cotton per acre. These results are based on averages obtained over a 9-year period.

Soils of east and north Delta require applications of phosphorus and potash in addition to nitrogen, according to results obtained at Marks, Money, Valley Hill, and Yazoo City.

COTTON TESTING AND BREEDING PROJECTS

Variety Studies

In order to determine the adaptation of cotton varieties to Delta farm conditions, field tests have been conducted by the Delta Branch Station at Stoneville for many years. The Station has adopted the practice of testing varieties on selected plantations in representative sections of the Delta in order to evaluate the performance of the various cottons under as nearly as possible the same conditions that they are to be grown by planters.

During the 1943 season, 12 varieties were tested at Stoneville, Marks, Money,

Heathman, Valley Hill, and Yazoo City.

Leading money value producers were Stoneville 2B, Stoneville 2C, and Deltapine 14, followed closely by Miller, Delfos 651, Rowden, and Bobshaw 1.

While the staple lengths of all strains are less than normally produced, the lengths of Delfos 444, Delfos 631C, Delfos 651, and Coker 100-7 probably were decreased by weather conditions to a greater extent than were the lengths of other varieties. This effect was, obviously, reflected in the money value of these cottons.

The earliest varieties were Bobdel, Delfos 444, Delfos 631C, and Delfos 651. Late varieties were Wilds 15, Rowden, and Deltapine 14.

Outstanding in fiber strength were Wilds 15, Bobshaw 1, Bobdel, and Rowden.

In regard to fiber length uniformity, Rowden, Miller, Bobshaw 1, Bobdel, and Deltapine led the list.

Samples from several varieties and strains were taken from the plots at Stoneville and sent to spinning laboratories, where the manufacturing qualities of the various cottons were determined.

Strain Studies

During the 1943 season, the following tests were conducted at the Delta Station in order to determine the relative values of recently-developed cottons: Miscellaneous Advanced Strain Study, with 49 strains; Delfos Advanced Strain Study, with 25 strains; and New Strain Study, with 49 strains. Yields of seed cotton and lint, gin turn-out, boll size, classer's length, and fiber data were determined. In these studies comparisons were made between recently-released strains and the parent or related strains to be replaced, between the various promising strains of individual breeders that are in the process of testing and seed increase, and between strains of different breeders.

The results have been used by commercial breeders to determine whether to release an entirely new strain and whether to replace an old strain with a newer strain. They have been used by farmers to assist them in deciding whether to use a new strain recently developed by commercial breeders or to continue with the older related strain.

Breeding Program

During the past season, Delfos 651 planting seed were released to Delta farmers through the respective county agents.

A new strain, a selection from 651, has a fiber tensile strength of 94,600 pounds compared with 83,300 pounds for the parent. During the past season the newer strain was equal to the older strain in yield, lint percentage, and staple length, and superior to it in regard to boll size and fiber length uniformity.

The Station has continued the work with Deltatype Webber 2139, which is a strain of considerable promise. Its yield, gin turn-out, boll size, and length uniformity compare favorably with those of the leading commercial varieties. Its actual staple length is 1-1/8 to 1-3/16 inches, and in recent tests it has the spinning quality of 1-9/32 to 1-1/2-inch cotton. In the 1942 spinning tests, it produced carded 22s yarns with a skein strength of 123.0 pounds compared with 134.2 pounds for the strongest yarn tested. In the 1943 tests, it produced combed 60s, 80s, and 100s yarns with skein strengths of 46.3, 30.7, and 21.8 pounds, respectively, compared with strengths of 48.7, 32.7, and 23.2 pounds, respectively, for Wilds. The lint yield of the Deltatype Webber was 33 percent higher than the yield of Wilds and was 95 percent of the yield of one of the most universally-grown varieties which produces a staple length of 1-1/16 to 1-1/8 inches and a 22s yarn strength equal to 85 percent of the equivalent strength of the Deltatype Webber. It is being tested extensively and grown in a 6-acre seed increase block.

Figure 9. New model flaming equipment attached to tractor.

CONTROL OF WEEDS, GRASSES IN COTTON BY FLAMING

Within the last decade considerable work has been done in developing a mechanical device for killing weeds and grasses in cultivated crops with a flame. The principle of the process is based upon the adjustment of a very hot air-blast flame so that it can be drawn by a tractor along rows of crops and will kill the weeds and grasses by flaming the leaves. The differentiation in burning depends upon the cultivated plant being tall enough to escape exposure of its leaves to the flame and the adjustment of the intensity of the heat and time of exposure so that the stems are not affected.

The following treatments were tested:

Cultivation—No hoeing—No flaming
Cultivation—No hoeing—Flaming
No cultivation—No hoeing—Flaming
Cultivation—Hoeing—No flaming

All plots germinated on May 12 and were plowed three times and hoed and thinned once before the test was started on June 12.

The cultivation—no hoeing—no flaming plots were badly infested with grass and weeds at the time of the first picking. All other plots were practically clean at time of frost. The amount of weeds and grass in the flamed plots was probably less than that found in the cultivated and hoed plots.

Under conditions of this experiment, no significant difference in yield between the plantation practice and the flaming alone treatments or between the plantation practice and the cultivation and flaming combination treatments was obtained. A significantly smaller yield was obtained from plots in which the weeds in the drill were not controlled than was obtained from the other three treatments.

The principle of controlling weeds and

grasses in cotton with flaming is sound. Its place in cotton production depends on its adaptation to the needs of the area and perfection of mechanical details. Considerable progress is being made in these respects, and the machine promises to become an important factor in the complete mechanization of cotton production.

Cotton Defoliation

Tests with dusting grade cyanamid for defoliating mature cotton plants were conducted in 1943. Considerable difficulty was had in getting the plants to shed their leaves following the applications of the defoliant. Because of the dry hot weather during July and August, the plants were in a permanent wilted condition. There were very light dews at night, and it is thought that this explains the lack of effect, inasmuch as defoliation was readily accomplished after rains in late August and September, accompanied by heavy dews.

No difference in yield of seed cotton was obtained in 1943 in tests where the rate of applying dusting grade cyanamid varied from 10 to 150 pounds per acre, applied in the fall of 1942.

Cyanamid, applied when the youngest bolls of the main crop were 10 days old, reduced the yield of seed cotton and tensile strength of the fiber. Where the youngest bolls were 30 to 40 days old when defoliation was accomplished, no difference in yield or tensile strength of fiber was found, as compared with normal cotton.

HORTICULTURAL PROJECTS

Sweet Corn Varieties

Ten hybrid sweet corn varieties were tested at this station in 1943. A good yield of corn was produced on all the varieties, but there were variations in earliness; and also in eating quality. None of these hybrids produced appreciably higher yields at this station in 1943 than the Golden Cross Bantam. The Golden Cross Bantam has high eating quality but is usually damaged more from corn earworms than the Aristogold.

Golden Hybrid 2439 has shown up well the past 2 years at this station and has high eating quality. It matures about the time of Golden Cross Bantam and Aristogold.

Topflight was a few days earlier than Golden Cross Bantam and also has high eating quality. Yields of Topflight compare favorably with Golden Cross Bantam under good growing conditions, and seem to be better than Golden Cross Bantam under dry weather conditions. Both the Topflight and Golden Cross Bantam are usually damaged more from corn earworms than the Aristogold. Sweet corn that is planted early seems to be damaged less from earworms than that planted later.

Tomato Varieties

In a test of 12 varieties and selections of tomatoes in 1943, Scarlet Dawn led all other varieties in production of marketable fruits, followed closely by Stokesdale. Both are early and produce smooth fruits. The Scarlet Dawn has better color than Stokesdale, but the former has little wilt resistance. Rutgers did not show up as well as it has in previous years, while Master Marglobe showed up better than in some of the previous years. Essary, Master Marglobe, and Indiana Baltimore produced about the same in total marketable fruit, which was slightly over 10 tons per acre, while the Scarlet Dawn produced 14 tons per acre.

The commercial stock of Pan America produced 4 tons of marketable fruit per acre, which was the lowest yielding variety. State College strain of Pan America produced 7.7 tons marketable fruit per acre. This variety has more resistance to fusarium wilt than the other commercial varieties.

Sweetpotatoes

After several years of investigation, it was found that sweetpotatoes grown on good Deer Creek loam of the Mississippi

Delta should not have any commercial fertilizer added for maximum production of marketable roots. According to results of the planting dates and spacing, the plants should be set approximately 12 inches apart in the row between April 20 and May 20.

Peach Varieties

A number of peach varieties, some of which are new ones, have come into production the past 2 years at this Station. A late winter freeze in March of 1943 almost ruined the 1943 peach crop in this area. The Belle of Georgia came through with less damage and produced a better crop than most of the other varieties. Veteran, Vedette, Viceroy, and Oriole were the other varieties that produced fair crops in spite of the freeze. Elberta, and similar varieties, were badly damaged by this freeze, and this variety only produced 0.88 bushels per tree as compared to 4.25 bushels per tree for the Belle of Georgia on the same age trees (4-year-old trees).

Apple Varieties

The large Cauley tree continued to outyield all other varieties in 1943 as in most previous years. However, trees of all ages of this variety blighted badly in the spring of 1944 and thus reduced the crop for this year.

A number of new apple and pear varieties were set in the spring of 1944, and some of these varieties are said to be resistant to blight. A number of new peach and plum varieties were also set in the spring of 1944.

HOLLY SPRINGS BRANCH EXPERIMENT STATION

Weather conditions during the season of 1943 were highly unfavorable over much of north Mississippi. Because of drought, practically all corn grown on hill land at the Holly Springs Station had to be cut for forage; lespedeza was so poor that it was not cut; soybeans and cowpeas grown for hay made little; and cotton, except on bottomlands, made less than half the average yields. Sorghum grown for silage, while making very poor yields and ripening no seed on account of a very early freeze, was sufficient to fill one 100-ton silo for the dairy cattle; while other silage was cut and cured as dry forage.

Quick recovery was made from the drought. All the corn was cut with a binder in September; and at once this land was planted to a combination of oats, wheat, and vetch. This combination was ready for making the best quality hay by the middle of May, when it was cut and stored in time to prepare the land and plant to corn. Good stands were secured before the first of June, after harvesting nearly 2 tons per acre of hay.

The usual experimental work has been carried on here, last year and this, principally in cooperation with specialists from the Central Station who plan the work and usually are present one or more times during the year to supervise the planting and harvesting of the crops. In the main, the results of such cooperative work in 1943 were successful insofar as desired information was concerned, although the yields were much lower than the long-time average. Even the cooperative work with hybrid corns in 1943 made enough grain, because of better moisture at the critical time, to give much of the information desired.

Beef Cattle. The herd of 30 south Mississippi native cows and an Aberdeen Angus bull was purchased 4 years ago for the utilization of onion-infested pastures not suitable for dairy cows, and to secure information on beef cattle production in north Mississippi. The calves have been marketed at weaning, and the undertaking has demonstrated the profit in beef production whenever good pastures and home-grown roughages for winter feed are provided.

Dairy Work. The number of cows kept for milk has been increased about

50 percent because of the scarcity of milk generally and the local demand for it.

Pastures. Much work is being done here to determine the best fertilizer for pastures and the best combination of grazing crops for growing in them. The experimental work is done largely in cooperation with agronomists from the Central Station, and the influence of phosphates on pasture production has been remarkable. Extensive investigations with pasture fertilization are being continued, including observations on the after-effects of work done in previous years.

Work with lime. Perhaps no other problem connected with Mississippi agriculture needs a more thorough study than the role of lime. The Government is helping the farmers to buy thousands of tons of lime in nearly every county, but little definite information is available as to the good to be expected. Research is being conducted on the value of lime for such crops as vetch, cotton, lespedeza, and wild winter peas. Recent work with the latter crop indicates rather outstanding increases in yields due to lime in combination with other plant foods.

Sorghum. In this latitude little or no sugarcane is grown, and farmers depend almost entirely on sorghum as a source of table sirup. A high-yielding variety producing high quality sirup is therefore desirable. In cooperation with the U. S. Sugar Plant Field Station at Meridian, a number of promising varieties of sorghum are being grown at Holly Springs, the production of which is made into sirup and data kept as to yields and amount and quality of products. In addition to the sirup sorgo work, a rather large acreage of sorghum is grown for silage, dry forage, and seed; and work is being started to determine the best rate of spacing sorghum in drills.

Small grains and cotton. A number of varieties of oats, wheat, rye, and barley are grown here every winter and records kept of winter hardiness, yields, etc. Similar work is done with varieties of cotton and soybeans. Such work with cotton has been partially responsible for the organization of many one-variety communities in north Mississippi with Holly Springs as a center, and for the growing of Stoneville 2B cotton because of the record it has made here as a most dependable kind.

Peanuts. Because large quantities of peanuts were desired for the war effort, and to supply the need of growers for specialized information, work has been conducted here to determine the best fertilizers for peanuts. At the same time, a sufficiently large acreage was grown on the Station farm to demonstrate economic possibilities and to encourage others to follow suit. This work was done last year with Tennessee Red and Spanish varieties, and is being repeated this year.

Tennessee Valley Authority fertilizers. For quite a number of years cooperative work has been conducted in testing the comparative values of different forms of phosphates and lime, and their use under cotton and winter legumes. This work is being continued and enlarged.

Hybrid corns. For a number of years much work has been done here in testing out the merits of hybrid and open-pollinated varieties of corn. While yields were smaller than usual because of the drought, worthwhile results were obtained.

Orchard work. A considerable number of peach, plum, apple, pear, and a few each of cherry and apricot trees were set out here in 1943 and have since been well cared for. While the trees in the main have grown well, the crops produced have been very poor, largely because of early spring freezes. The land on which this orchard was planted is not well suited to growing fruit of the best quality.

Soil fertility studies. In 1933 much work was started here to determine the possibility of building soils with summer and winter legumes, as well as in de-

termining the best kinds and amounts of fertilizers for use under the common field crops such as cotton and corn. This work is being continued and occupies a considerable part of the test plots used here. It has shown the preponderating value of nitrogen for all non-legumes, with phosphorus, potash, and lime showing value in corresponding order; and of phosphorus for most legumes.

NATCHEZ BRANCH STATION

A large part of the work done at the Natchez Branch Experiment Station is in cooperation with the various departments of the Central Station at State College, and with other Branch Stations. Since the result of this cooperative work has either been published or will be published in the near future, this report is intended to give the reader an idea of a part of the work that has been done at the Station during the past fiscal year and not reported in other Station publications.

Pasture Improvement

The research program at the Natchez Branch Station is primarily concerned with beef cattle and pasture problems which occur in southwest Mississippi. Since the Station undertook such a program, every effort has been made to improve pastures, and at the same time the number of cattle has been increased rapidly in order to maintain a sufficient number on hand to do the job assigned to us. However, it was realized that the pastures were too heavily stocked to respond to good management as they should. To correct this condition one-half of the cattle at the Station were sold in March 1944. Since that time the pastures have responded well to the recommended pasture practices.

These pastures have been terraced and seeded, have received applications of phosphate every year since establishment began, have been clipped as often during the summer months as it was thought necessary, and through the AAA program 150 tons of lime has just been received to be used on them in the near future.

Beef Cattle Improvement

Foundation stock for the Station herd consisted largely of native south Mississippi cows, which were bred to purebred Hereford and Polled Hereford bulls. The heifer calves produced by these crosses have been saved and used to replace their dams. At present all of the native cows have been sold with the exception of five, and the herd consists almost entirely of good first-cross Hereford and Polled Hereford heifers. All of these young heifers that were old enough were bred their first time last summer to a Hereford bull and now have good three-quarter Hereford calves at their side.

Seed Production

Crimson clover. Because of an increased amount of interest in Southwest Mississippi in the production of clover seed, part of the Station program has been directed toward problems relative to clover seed production. In addition to a clover variety and fertilization test which has been conducted for the past 5 years, several acres of crimson clover was planted last fall. This clover provided good grazing for cattle off and on during the winter and spring months. Around March 15, the cattle were taken off the clover, and by the last of May or the first of June a good crop of seed was ready for combining. After the seed had been harvested, the ground was broken up and planted back to Alyce clover to be combined this fall. The crimson clover should have been grazed much longer than March 15, but because of a lack of fencing facilities to separate the clover from other test plots which were being prepared for planting at this time, the cattle were moved off the clover.

Wild winter peas. Wild winter peas were planted on the Station land the first time last fall. They were planted at the rate of 27 pounds of seed per acre on unfertilized soil. An average of 383 pounds

of seed per acre was harvested and probably 200 pounds of seed per acre shattered out on the ground before they were combined. Yields of wild winter peas usually run much higher, but because this particular field was not fertilized, and also because the seed did not ripen evenly, quite a few of them ripened and shattered out while others were still green. It might have been possible to save more seed if they had been cut earlier while the vines were still green and if they had been allowed to dry before being picked up with the combine. In fact, this method was tried, but by the time this was done about half of the vines had already dried up and mowing caused more to shatter. Combining while the plants were still standing worked well, except in those places where they were too green to combine.

Like the crimson clover, the wild winter peas were grazed from the time they were large enough until March 15. However, the cattle did not seem to like the peas nearly so well as they did the clover. The clover was grazed to the ground by the time the cattle were moved, while the peas had been grazed very little. The cattle had access to both the clover and the peas at the same time.

Hop clover. An attempt was made to save hop clover seed this spring. Indications are that it would have been successful had it not been for excessive rains about the time they were ready to harvest. Small areas harvested just before the rains turned out fairly good seed yields. This work will be continued next year, and different methods of harvesting such as were planned for this year will be tried.

Hodo sorghum. This year the Station is producing Hodo sorghum for certified seed purposes. About 12 to 15 acres have been planted to this crop. This variety of sorghum has been planted here before, and it was found to produce well and make an excellent quality silage. It has also been recommended by the Mississippi Station for sirup production.

ACTIVITIES OF THE RAYMOND BRANCH EXPERIMENT STATION

This report contains a summary of the work conducted on the Raymond Branch Experiment Station for the year 1943-44. There were some abnormal seasonal characteristics during the crop year. The early spring season was wet and cold, delaying land preparation and planting. During July, August, September, October, and part of November, there was very little rainfall. Corn and hay crops in some instances were complete failures. Because of the severe drouth some of the test crops dried up and withered away. It was so dry in October and November that small grain and winter cover crops were late coming up. The drouth was so severe that most of the lespedeza failed to make growth enough to cut and failed to reseed.

Some of the experimental work on the Raymond Branch Station is devoted to studying different systems of crop rotation. A rotation that has been conducted for several years consists of cotton, corn, oats, lespedeza, soybeans, crotalaria, and vetch. The results from this rotation are very little if any different from other years.

Cotton. Cotton is the major cash crop of this section and the yield of cotton on the Station and surrounding section was satisfactory. Much attention has been given this crop from the standpoint of varieties and fertilizer, and some consideration has been given to boll weevil control and spacing and disease. Two cotton variety tests were conducted on this Station in cooperation with the Central Station at State College. One test was on hill soil and one on valley soil. There were 15 varieties in the test. On the hill test the varieties ranked in seed cotton as follows: Bobshaw 1, Cleveland 54, Coker 100-Wilt, and Stoneville 2B. In the valley test Deltapine 14, Stoneville

2B, Bobshaw 1, and Coker 100-7 led. The four varieties recommended for this section are Deltapine 14, Stoneville 2B, Coker 100-7, and Bobshaw 1. There are still a few who cling to Wilds, and some to Hi-Bred. Cleveland is still a good cotton, but few people consider it among the best. Delfos is still recommended, but the yield and boll size went down during the dry weather last year. Hi-Bred is a high ranking cotton in lint yield, but the staple is short. In addition to the varieties of cotton, the Station grew some new strains and some selfed lines of hybrids and selections, working to higher grades and other desirable characteristics. Some strains look as though they may have some promise in the cotton world.

Cotton fertilization. The fertilizer work with cotton in cooperation with the Central Station was a continuation of the work started before 1943 and of a new test started in 1943 with high analysis fertilizer. There has been a definite response to nitrogen, phosphorus and potash, especially nitrogen. Some soils need potash more than others.

Fertilizer and lime studies for a 7-year period with cotton have shown that an annual application of 400 pounds of 4-8-8 and 500 pounds of ground limestone has increased the yield of seed cotton 100 pounds or more per acre as compared with an application of 400 pounds of 4-8-4.

Winter legumes versus commercial nitrogen. This test is a continuation of the test started several years ago. It consists of a 300-pound mixture of 6-8-4 versus 0-8-4 plus hairy vetch, 0-8-4 plus common vetch, 0-8-4 no nitrogen, 0-8-4 plus bur clover, 0-8-4 plus crimson clover, and 0-8-4 plus Austrian peas. It has been difficult to get a good stand of bur clover and Austrian peas each year. The 6-8-4 with commercial nitrogen has increased the yield of seed cotton about 200 pounds more than the nitrogen from the legumes.

The forage crop and fertilizer with forage crops and varieties of lespedeza were almost a complete failure due to the severe drouth.

The test on the potash requirements of legumes on Mississippi soils was almost a complete failure as far as results were concerned, due to the severe drouth and salt spots.

The experimental work with peanuts shows that excellent peanut yields can be obtained on brown loam soils. Peanuts did not show much response to fertilizer. The greatest increase in pounds per acre was received from the 4-8-8 plots: 1030 pounds of nuts per acre as compared with 830 pounds from the no fertilizer plots and 3660 pounds of hay from the 4-8-8 as compared with 2700 pounds of hay from the unfertilized plots.

Tests of corn and soybeans. In a comparison of 25 varieties and hybrids, Louisiana hybrid ranked highest with a yield of 49.6 bushels per acre, and Florida White lowest with a yield of 26.1 bushels per acre.

The soybean variety test and the soybean regional test were both a complete failure due to the severe drouth and salt spots developing in the soil.

Other experiments tested outstanding strains of soybeans, some of which showed promise for this section. The early varieties do not make vine enough in the South and one that does make a good stalk has difficulty with seed germination. The greatest need of soybeans in this section is for a bean that can be interplanted with corn, a bean that will make a good-sized plant that will produce well and ripen about the time that the corn is harvested. This will give considerable pasturage for the livestock, and all the residue will be returned to the soil.

Small grain test. To get comparative yields of varieties of oats, barley, wheat, and rye, 15 varieties of oats, 5 varieties of barley, 1 of wheat, and 1 of rye, were tested. The highest yield in pounds per

acre was Victorgrain No. 1 with a yield of 2693.5 pounds. In second place was Victorgrain No. 2 with a yield of 2473.2 pounds per acre.

SOUTH MISSISSIPPI BRANCH STATION, POPLARVILLE

Most of the work of the South Mississippi Branch Station is in cooperation with either the Central Station at State College, Mississippi, or the U. S. Department of Agriculture. The Tung Field Department is doing considerable work with tung trees, and all this work is in cooperation with the U. S. Department of Agriculture. At the South Mississippi Branch Station proper, the work is devoted to field crops such as corn, cotton, small grains, sugarcane; and with garden crops such as cabbage, beans, sweet corn, tomatoes, and cucumbers. In addition, some preliminary work has been done with pasture crops, and it is expected that this work will be expanded considerably to meet the demands of the South Mississippi livestock growers.

Variety Studies

Cotton. The 1943 cotton variety test contained fifteen of the leading varieties of cotton. In yield of lint cotton per acre Cleveland 54 led with 364 pounds, followed by Hi-Bred, 345 pounds; Coker 100-Wilt, 290 pounds; Bobshaw 1, 281 pounds; Delfos 651, 269 pounds, and Stoneville 2B, 261 pounds. In total value per acre Cleveland 54 led, followed in order by Delfos 651, Hi-Bred, Coker 100-Wilt, Bobshaw 1, and Boboak.

Corn. The Florida hybrids again showed up exceptionally well in weevil resistance because of their excellent husk coverage, and the yield of Florida Hybrid W-1 and Florident White was equal to that of Mosby, a standard variety. The Florida Hybrid W-1 had a weevil infestation of 4.3 percent, Florident White 12.6 percent and Mosby 48.5 percent. Yields of the three varieties were slightly above 27 bushels per acre. Three Louisiana Hybrids led in yields: La. Hybrid 123 with 33.5 bushels per acre, La. Hybrid 173A, 31.6 bushels, and La. Hybrid 468, 30.8 bushels per acre. The percent of weevil damage was 20.2 percent, 19.2 percent and 19.8 percent, respectively, for the Louisiana hybrids.

Small grains. Fulgrain 5 led the test with 944 pounds of oats per acre. It was followed by Delta Red, 733 pounds; New Nortex, 639 pounds; Victorgrain 1, 636 pounds and Fulgrain 6, 617 pounds. Yields of barley, wheat and rye were extremely low, Texan barley yielding 261 pounds, Red Heart Wheat 99 pounds and Abruzzi rye 269 pounds per acre.

Vegetable varieties. One year's results have been obtained with tomato and cabbage varieties. In the tomato variety test, the Rutger Certified led with 9,478 pounds marketable fruit per acre. This was followed in order by Stokesdale, 8,831 pounds; La. Dixie, 7,644 pounds; La. Gulf State, 7,640 pounds; Gulf State Market, 7,362 pounds; and Master Marglobe, 6,806 pounds. The Pan America variety or any of the Pan America selections did not yield more than half as much as did the Rutger. In percent of marketable fruit of total production, Rutger Certified led with 65 percent followed by Master Marglobe, 61 percent; Stokesdale, 60 percent, and La. Dixie, 60 percent.

In the cabbage variety test, Detroit Resistant led, producing 12,077 pounds per acre; Golden Acre, 11,780 pounds; Seneca, 10,918 pounds; Marion Market 10,906 pounds; and Copenhagen Market, 10,484 pounds per acre.

Sugarcane Studies

The sugarcane work at the Station is in cooperation with the United States Department of Agriculture. In the variety test, C. P. 29/116 continues to lead in tons of cane per acre, as well as gallons of sirup per acre. In addition, the sirup from this cane is of superior quality as compared with other varieties. C. O. 290 and C. P. 31/511 have produced good yields, but the sirup is of inferior

Figure 10. Sugarcane at the Poplarville Station, has yielded as much as 21.74 tons of cane per acre.

quality. For chewing purposes C. P. 31/511 variety is recommended.

In the fertilizer test it has been shown that from 800 pounds to 1000 pounds per acre of a complete fertilizer such as 6-8-4 applied in two applications is sufficient. The first application of about 500 pounds should be made when the cane is knee high and the second application of from 300 to 500 pounds when the cane is waist high. The nitrogen in the above fertilizer should be from either cottonseed meal or ammonium sulphate.

From the preliminary work which has been done on the rates of planting, indications are that one and one-half stalks (stalks placed end to end with a half stalk at the union) is sufficient to result in a good stand of cane.

Other Problems Being Studied

Various studies which have been recently initiated and will be reported from time to time include fertilizer work with lespedeza, winter and summer legumes, cucumbers, pasture grasses, lime requirements of soils, fertilizer work with cotton, corn and oats, and variety studies with sweet corn and pole beans.

Tung Field Department

Included in the work with tung trees are studies with reference to the fertilizer requirements of the tung plant, pruning studies, soil management problems and varieties. Since the oldest plants are only four to five years old and not in full production, no definite conclusion can be drawn.

In the fertilizer analyses test, indications are that phosphorus is a limiting factor in the production of tung nuts. When phosphorus was used in combination with nitrogen the production of nuts increased approximately four and one-half times over nitrogen alone, in these young trees. The use of phosphorus also increased the oil content of the nuts

about one percent.

In the fertilizer rates test using 8-8-4 at the rate of one-fourth, one-half and one pound of fertilizer per tree per year's growth, one-fourth pound has produced as many nuts as the one-half pound application, at the end of the third year. One pound of 8-8-4 produced 211 pounds of nuts per acre; whereas, one-half pound produced 173 pounds of nuts.

The work with soil management problems has not continued sufficiently long to show any differences in the performance of the trees. The use of basic slag at the rate of 500 pounds per acre has increased the green manure crop more than 200 percent over 500 pounds of 2-8-4 plus 500 pounds of lime per acre.

Numerous selections of trees with outstanding performance have been made in an effort to secure plants which will be uniform and produce heavy crops of fruit. Among those selected the A-4 A-12, L-2, L-14, M-2, F-99, F-541, F-94 and G-40 are showing promise.

TRUCK CROP INVESTIGATIONS AT CRYSTAL SPRINGS STATION

Victory Garden Notes

During the fall of 1943 approximately 15 varieties of vegetables were grown in a small scale garden observation test. Some irrigation was provided when necessary. Among the vegetables showing good growth and producing well under moderately dry conditions were: Kentucky Wonder pole snap beans, bush lima beans, cabbage, rutabaga, squash (winter and summer varieties), carrots (several varieties) and Imperial 847 head lettuce. Tomatoes set late and failed to vine ripen. However, a good crop of mature green fruit was harvested before frost.

In the spring of 1944 garden observation tests were made on several vegetables. An early planting of several English pea varieties was made on January 7. During February a freeze, approximately 18°F., severely injured or killed vines of all varieties except Wando and No. N757-3. These two lines were received from Dr. Wade of the Federal Station at Charleston, S. C. Both lines carry a high degree of cold resistance but are too late in maturing to be satisfactory as a commercial crop.

Other vegetables placed in a garden scale test included cauliflower, broccoli, kohlrabi, cabbage, and rutabaga. Several varieties of cauliflower were under observation, but no single variety appeared outstanding. An early setting of cauliflower was killed by a 20°-22° F. freeze, while cabbage was only slightly injured. In general broccoli, kohlrabi, cabbage, and rutabaga yielded well. Kohlrabi appeared markedly resistant to cold. Great Lakes head lettuce appeared promising in the first preliminary test at this Station.

Peas

The English pea industry has long been an early cash crop to truck growers in Mississippi, but for the past few years it has lost most of its popularity. This is due in part to high costs of production for a commodity which in too many instances affords too little returns to the farmer. If the pea industry in Copiah and adjoining counties is to survive, the unit cost of producing a hamper of peas must be reduced, or the price received by the farmer must be increased. Reduction in unit cost of production is the plan most likely to succeed. This can be accomplished by selecting high yielding varieties, making proper fertilizer applications, planting at the proper time, and controlling birds when the peas are coming up.

Varieties. A comparison of about 30 varieties of peas indicated considerable difference in yield in the 1944 spring trials. Two of the newer varieties, which are still in the experimental stage, yielded more than any of the commercially grown varieties. One of these, No. 301, produced 133 hampers to the acre in the test this year. This is about 25 hampers

Figure 11. The Rutgers variety pruned to a single stem.

more than Thomas Laxton, and 59 hampers more than World's Record. Glacier produced 101.9 hampers; Gradus, 81.5; Progress No. 9, a dwarf variety, 81.5; and Hundredfold, another dwarf, 100.8 hampers to the acre.

The No. 301 pea has been in the trials for 3 years and has been a consistently high yielder each year. In 1942 it ranked third in the yield tests and 1943 it was second. One strain of Thomas Laxton outyielded it in 1942 and 1943 by only a few bushels. This pea is of the tall plant type, its pod length almost equals World's Record but is of a lighter green color. The quality is almost as good as World's Record and the variety is slightly earlier.

Another variety, No. 615, which was tested for the first time this year, showed excellent commercial possibilities. It is a World's Record type and outyielded all except one variety tested this year. It produced 182.4 hampers per acre. More detailed tests are needed on this variety before it can be recommended to the commercial growers. Other varieties which the home gardener should like are Alaska, Hundredfold, Wanda, Mardelah, Little Marvel, Wisconsin Early Sweet, and American Wonder, named in order of fruitfulness. Alaska, Mardelah and Wisconsin Early Sweet are about equal in table qualities. Little Marvel and American Wonder both have excellent table qualities. Wanda, a variety recently released to the seed trade, showed up very well in the test this year. Because of its ability to withstand adverse weather conditions and then produce abundantly, even though it is about 10 days later than Little Marvel, it should be tried in all the home gardens of the State.

Fertilizer tests conducted this year confirm previous reports that 800 to 1000

Figure 12. The Rutgers variety pruned to two stems (note the good protection of foliage on this plant).

pounds 5-10-5 plus 100 pounds of nitrate of soda applied as a side-dressing is the most economical fertilizer to use with peas.

Time of planting has been observed both on the Station and on farms in the county, and it seems conclusive that peas should be planted between January 25 and February 5.

No pests bothered the pea crop this year except birds (field larks) which attacked the crop about the time it was coming up. These pests were, and almost always are, a problem. Two methods of combating them are suggested: (1) Be sure all peas are well covered, 3 to 4 inches deep, at planting time so as not to attract the birds; (2) have a competent boy, who can be obtained rather cheaply, to guard the fields in the early morning and late afternoon when the plants are breaking through the ground.

Cabbage

Ten varieties were tested in a detailed experiment this season. Asgrow's Copenhagen Market produced 8.1 tons; Marion Market, 6.8; Ferry's Round Dutch, 6.6; Glory of Enkhuizen, 6.5; Detroit Resistant, 6.3; Golden Acre, 5.6; Ferry's Cophenhagen Market, 5.8; Asgrow's Round Dutch, 4.9; and All Head Select, 4.6 tons to the acre. Golden Acre was the earliest variety, Round Dutch and All Head Select were the latest in the test. Thus a farmer should expect to get more early yield from Golden Acre, but for total yield Copenhagen Market and Marion Market are better. Copenhagen is slightly earlier than Marion Market. Ferry's Round Dutch is a good hardy cabbage; however, the heads are moderately small.

In another test several varieties were under observation. The yields varied from 5.7 for Premium Late Flat Dutch to 10.3 tons to the acre for Seneca. Other varieties which approached 9 and 10 tons per acre were Penn. State Ballhead, Wisconsin Ballhead, Madison, Volnot, Huguenot, and Wauchula. The last four are recent developments from the U. S. Department of Agriculture Breeding Laboratory of Charleston, S. C. These four varieties each have certain excellent characteristics with the main one being good-sized compact heads. Sufficient data has not been obtained on any of the varieties in this observational test by this station to warrant a recommendation, except for the Seneca variety. It has been observed 2 years and has proved to be a very good variety. Two outstanding characteristics have been noted. First, it is early and can be cut along with, if not before, Golden Acre. Second, after the heads become firm and ready to be cut, this variety can be left in the field for several days without damage due to heads bursting.

Those interested in growing cabbage for the local market or home use will find Early Jersey Wakefield hard to beat. It is very early, and produces heads of a desirable size for home use. It is not accepted on the market for distant shipping because it is a pointed head and does not ship well. The table qualities are excellent.

Fertilizer data collected from several years of experimental work with different grades and amounts show that applications of 1,000 to 1,200 pounds of 6-8-4 is the most economical fertilizer to use. Side-dressing experiments set up in connection with this work indicate that 200 pounds of nitrate of soda produces good yields to the acre, but if a second application consisting of 100 pounds of nitrate of soda should be applied when heads begin to form, the yields will still be profitably increased.

Lime and Boron. The results obtained to date show no differences great enough to be of practical importance.

Cabbage Mildew or Rust Resistance Test

Approximately 70 seed lots including commercial cabbage varieties and related

Figure 13. Effect of increasing the level of nitrogen in the 1000-pound fertilizer mixture. Row on left received 6-8-4; row on right received 4-8-8. Each plot received top-dressing with nitrogen at the rate of 200 pounds of nitrate of soda to the acre. Photo by C. M. Tingle.

species were tested for resistance to cabbage mildew or rust. None of the commercial cabbage varieties proved highly resistant. All varieties of cauliflower, broccoli, brussel sprouts and kohlrabi tested were found to be susceptible. However, all varieties of Chinese cabbage tested were highly resistant or immune to the mildew disease. In addition all varieties of rutabaga tested appeared highly resistant, also one variety of kale.

Benzol Control of Cabbage Mildew

During the past fall and winter preliminary experiments were set up under conditions especially favorable for mildew development. Under these severe conditions the following benzol treatment proved effective in the control of cabbage mildew.

When applied each night at the rate of 50 cc. per sq. yd. and under wet covers of 48x44 muslin cloth. The first benzol application was made as soon as plants were up to a stand, and nightly treatments were continued until plants were ready for field transplanting. In this experiment untreated beds were severely damaged from mildew.

In one experiment benzol was applied at the rate of 50 cc. per sq. yd. three successive nights per week, from emergence until production of the fourth true leaf. However, when plants were of size and age suitable for field transplanting they were covered and strawed for a period of 2 to 3 days, because of freezing temperatures. During this period the mildew disease became active, and many plants were killed.

As yet the benzol method for the control of cabbage mildew cannot be recommended to the grower. Considerable progress has been made; and other materials, both gas and spray, are under investigation. It may be possible in the

near future to recommend one or more practical control measures.

General Disease Notes

The poor stand commonly observed in fields of English peas was, in part, due to pre-emergence damping-off and caused by one or more soil-borne parasites. At this Station pre-emergence damping off reduced the stand in several plots.

Cabbage mildew or rust was the limiting factor in preventing a majority of truck growers from raising sufficient cabbage plants for their own use. Nearly all growers were forced to buy part or all of their cabbage plants. One of the principal objections to shipped-in plants is the constant danger of introducing additional or new diseases and insects. Nearly all cabbage plants shipped into Mississippi during the past season carried cabbage aphids or lice. It is entirely possible that diseases were also introduced.

Snap beans, at the Station and in most fields observed, were relatively free from disease. Mosaic was not particularly prevalent this season.

Tomato diseases were abundant and destructive during the 1944 season. Damping-off of seedlings in the seedbed, cold frame, and field was observed in the Hazlehurst area. This disease was found to be the **Macrosporium** early blight, and caused considerable loss to a number of growers.

Phytophthora late blight, a disease of both foliage and fruit, appeared to be centered principally north and west of Crystal Springs. Whenever present this disease caused considerable loss, on some fields damaging an estimated 50 percent or more of the fruit. Two additional foliage diseases, **Septoria** and **Alternaria** blights, were present in the Crystal Springs area. In many fields foliage was killed half way up the plant before the green wrapper harvest began. In addition, a bacterial fruit spot, **B. vesicatorium,** was prevalent; and occasional fruit suggesting **Macrosporium** nail-head spotting were observed. **Sclerotium** rot, a fungus disease, attacking tomato roots, stems, and fruit, was also present. Mosaic, of the several diseases observed, appeared less prevalent than in 1943.

Publications of the Experiment Station

To meet the wartime need by farmers for research information as the basis for increased production from familiar farm enterprises, as well as from relatively new enterprises to which emphasis has been shifted, the Mississippi Agricultural Experiment Station during the year ended June 30 published a volume of information approached only by that of the two preceding war years.

Agricultural experiment stations were established by Act of Congress in 1887, and most of them, like the Mississippi Station, are now more than 50 years old. It is the object and purpose of experiment stations to conduct original research bearing directly on the agricultural industry of the United States, and to publish and mail to interested farmers the results of agricultural research work.

The publication program of the Mississippi Station is diversified in order to meet the needs, as best may be done within the limited finances, of an agricultural State of nearly 300,000 farmers. Much of the research information is most readily available when confined to a single printed page; some of it must be extensively presented, and bulletins of more than a hundred pages are sometimes published.

Altogether, the year's work includes the issuance of a total of 137 separate publications of seven different kinds, ranging in size from 1 page to 122 pages, and totaling approximately 1200 pages of bul-

letin size. A total of 600,000 copies were printed.

Information concerning the various kinds of publications and numbers issued is as follows:

Experiment Station bulletins are reports of research work by the Station, usually on common farm problems and written for the use and guidance of farmers and farm leaders. They are supplied only upon request. Seventeen farmers' bulletins were published during the year, ranging in size from 8 to 122 printed pages, and in number of copies from 2,000 to 10,000.

Journal articles are technical in nature and were published in scientific journals to the extent of 13 during the year.

The Director's Annual Report is required by law and is published every fiscal year under the title "A Year in Farm Research."

Circulars are briefer than bulletins, usually ranging from 4 to 20 pages, and may include matters of farm interest other than experimental results. Thirteen circulars were published during the year, mostly 8-page, and ranging in number from 2,000 to 5,000 copies.

Cooperative bulletins are based on research done in cooperation with other states and are jointly written by workers from the cooperating Stations. Five cooperative bulletins were prepared during the year.

Progress reports are, in the main, annual reports of progress of work under way, such as fertilizer, variety, and animal feeding tests. Usually a single printed page, letter size, progress reports are in two classifications: **Information Sheets** are those from the hill stations, of which 23 were published during the year, averaging 3,000 copies each; **Service Sheets** are those from the Delta Branch Station, of which 12 were published during the year, averaging slightly over 6,000 copies each.

Press reports are issued to all newspapers in Mississippi and cities of adjoining States. In the main, the press report is one mimeographed page, and directs farm attention to research information available on timely subjects. One or more press reports direct attention to every farmers' bulletin published by the Mississippi Station. Press reports are released every Thursday, and 53 were issued during the year.

Mississippi Farm Research is an unique and original method developed by the Mississippi Station for presenting timely research information to a large number of farmers at regular intervals, and at minimum cost. It is tabloid size (about 12 by 18 inches), 8 pages, and is published every month. An issue contains approximately the same amount of printed material as a 40-page bulletin of conventional size.

One unique feature of Farm Research is that the progress reports and most of the bulletins and circulars described above are first printed in Farm Research, and thus are made immediately available to large numbers of farmers. The type and cuts are then re-used for printing in conventional form.

Altogether, 12 issues of Farm Research were published during the year, each to the extent of 27,000 copies. The contents included 10 bulletins, 12 circulars, the annual report, 20 information sheets, 12 service sheets, and 74 other articles giving research information on a wide variety of agricultural subjects.

Mississippi Farm Research and some of the progress reports are sent to regular mailing lists. Bulletins, circulars, technical bulletins, and progress reports are sent to a small official list, but are mainly distributed to farmers upon individual request.

Publications of the Mississippi Agricultural Experiment Station

Editorial Department

July 1, 1943 to June 30, 1944

No.	Title	Pages	Copies
	BULLETINS		
391	Planting Cottonwood on Bottomlands—Henry Bull and H. H. Muntz (MFR)	20	5 M
392	Sweetpotato Production: Mechanical Equipment Studies—John W. Randolph and W. S. Anderson	100	3 M
393	Home Orchards in Mississippi—T. E. Ashley and Troy H. Jones (MFR)	39	8 M
394	Commercial Agricultural Production and Marketing Methods and Facilities in Mississippi—D. Gray Miley	96	3½ M
395	Sugarcane Production in Mississippi—I. E. Stokes and T. E. Ashley (MFR)	20	3 M
396	Cotton Varieties in Hill Section of Mississippi—J. Fred O'Kelly (MFR)	8	3 M
397	Fertilizers of Cabbage, Peas, and Tomatoes—E. L. Moore and J. A. Campbell (MFR)	24	5 M
398	Cotton Variety Tests in the Yazoo-Mississippi Delta—J. Winston Neely and Sidney G. Brain (MFR)	8	10 M
399	Tomato Production in Mississippi—L. R. Farish, E. L. Moore, and E. A. Currey (MFR)	20	4 M
400	Livestock Auctions in Mississippi—D. W. Parvin	88	5 M
401	Milk Production—H. O. West	—*	7½ M
402	Starch Sweetpotato Production—Fertilization and Hill Spacing Studies—W. S. Anderson and John W. Randolph	24	3½ M
403	Economic and Cost Study of Cotton Ginning in Central Mississippi—D. Gray Miley and Arthur L. Roberts	32	3½ M
404	Organization and Operation of Farms in Black Prairie Area, Mississippi—W. G. O'Leary	52	3 M
405	Farm Organization and Adjustment Problems in the Shortleaf Pine Area of Mississippi—E. A. Tucker and Frank J. Welch	—*	3 M
406	Rural Land Market Activity in Mississippi—Dudley E. Young, Marvin A. Brooker, and Frank J. Welch (MFR)	16	3 M
407	Saving Minerals and Vitamins in Fresh Vegetables and Fruits—Olive Sheets (MFR)	16	3 M

*In process of being printed.

	CIRCULARS		
110	How to Lime and Fumigate Corn Cribs for Weevil Control—A. L. Hamner and Clay Lyle (MFR)	8	3 M
111	Digging Table Stock Sweetpotatoes with Broad Base Plows—John W. Randolph and W. S. Anderson (MFR)	8	3 M
112	Minerals for Livestock in Mississippi—V. R. Berliner, Paul F. Newell and J. S. Moore (MFR)	4	30 M
113	Dehydration of Fruits and Vegetables—Olive Sheets (MFR)	4	2 M
114	Control of Vegetable Diseases in Home Gardens—J. A. Pinckard (MFR)	12	2 M
115	The Value of Fertilizer for Oats in Mississippi—Russell Coleman and T. E. Ashley (MFR)	8	3 M
116	Buying Fertilizer for Cotton Production in 1944—W. B. Andrews (MFR)	12	2 M
117	Growing Sorgo for Sirup Production in Mississippi—I. E. Stokes, W. S. Anderson, and E. B. Ferris (MFR)	8	3 M
118	Control of Weeds and Grasses in Cotton by Flaming—J. Winston Neely and Sidney G. Brain (MFR)	8	10 M
119	Watering Equipment for Poultry—H. D. Polk (MFR)	8	4 M
120	The Value of Fertilizer for Corn—Russell Coleman (MFR)	12	5 M
121	Studies with Recently Developed Cotton Strains in the Yazoo-Mississippi Delta, 1943—J. Winston Neely and Sidney G. Brain	8	10 M
122	The Production of Sorgo Sirup in Mississippi—I. E. Stokes, J. Fred O'Kelly, and E. B. Ferris (MFR)	8	4 M
	SPECIAL CIRCULARS		
2	Economic Problems in Mississippi and the South—Frank J. Welch (MFR)	12	2 M

FIFTY-SIXTH ANNUAL REPORT

Highlights of the Work of the Mississippi Experiment Station for the fiscal year ending June 30, 1943 (MFR) ..... 56 1½ M

PROGRESS REPORTS

Information Sheets, published from July 1, 1943 to June 30, 1944; 22 separate printings, each 2,000 to 7,000 copies ..... 31 49 M

Service Sheets, published from July 1, 1943 to June 30, 1944; 12 separate printings, mostly 6,000 copies each ..... 15 72 M

PRESS RELEASES

Newspaper articles prepared and distributed every week to all newspapers in Mississippi and in cities of adjoining states; number releases 53, total number copies (186) ..... — 9,858

MISSISSIPPI FARM RESEARCH

Monthly publication of Experiment Station results, 12 issues during year, 30,000 copies per issue. Contents include publications listed above, classified as follows: 9 Bulletins, 12 Circulars, 56th Annual Report, 20 Information Sheets, 12 Service Sheets, plus 74 other articles.

JOURNAL ARTICLES

No.	Title	Author
72	Use of Root Pressures in Determining Injury to Roots by Cultivation	O. A. Leonard
73	The Present Aspects of Artificial Insemination of Farm Animals	V. R. Berliner
74	Influence of Certain Soil Amendments on the Yield of Cotton Affected by the Fusarium-Heterodera Complex	J. A. Pinckard and O. A. Leonard
75	Residual Effect of Varying Applications of Potash on the Replaceable Potassium in Several Mississippi Soils	C. Dale Hoover
76	The Hemoglobin Concentration and Euythrocyte Counts of the Blood of College Men and Women	Olive Sheets and Melle Ward Barrentine
77	The Role of Artificial Insemination in Horse Production in the Past and the Future	Victor R. Berliner
78	Phosphorus Fixation by the Coarse and Fine Clay Fractions of Kaolinitic and Montmorillonitic Clays	Russell Coleman
79	The Effects of Nitrogen Upon the Response of Cotton and Oats to Phosphorus	Russell Coleman
80	Cotton Responds to Boron on Grenada Silt Loam	Russell Coleman
81	Systemic Invasion of Cabbage Seedlings by the Downy Mildew Fungus	F. J. LeBeau
82	Effect of Boron and Lime Upon the Quality of Cauliflowers	Russell Coleman and F. J. LeBeau
83	Boron Content of Mississippi Soils and Plants	Russell Coleman
84	The Embryology of Paspalum Dilatatum	H .W. Bennett

MAILING ROOM

JULY 1, 1943 TO JUNE 30, 1944

Month	No. Requests	No. Publications Mailed	Bulk Mailings
July	174	934	55,130
August	206	996	4,540
September	172	1,608	332
October	217	2,046	4,319
November	264	4,118	1,456
December	243	2,825	2,580
January	229	851	165
February	303	1,549	2,960
March	354	1,584	38,894
April	352	2,087	6,225
May	341	1,677	8,011
June	379	2,445	1,412
Total	3,234	22,720	126,024
Average (12 mo.)	312	1,893	10,502

DISBURSEMENT OF EXPERIMENT STATION FUNDS, 1943-44

Federal Funds

	Hatch	Adams	Purnell	Bankhead-Jones	Sales
Personal services	$11,399.66	$12,465.35	$42,736.16	$56.399.71	$12,392.76
Travel	690.76	357.81	1,345.22	973.48	1,674.93
Transportation of things	18.82	41.42	648.56	290.36	335.35
Communication service	288.81	14.45	477.85	256.16	209.72
Rents and utilities	153.56	274.50	757.10	1,471.83	467.15
Printing and binding	934.04	xx	483.98	1,502.55	xx
Other contractual services	275.94	474.61	1,042.97	781.37	1,493.16
Supplies and materials	455.25	1,170.14	8,221.31	8,078.88	7,815.65
Equipment	282.16	201.72	3,635.37	1,965.06	607.93
Land and structures (Contractual)	500.00	xx	651.48	932.00	1,320.46
Contributions to retirement	xx	xx	xx	xx	xx
Unexpended balance	xx	xx	xx	xx	71,613.45
TOTAL	$15,000.00	$15,000.00	$60,000.00	$27,651.40	$97,930.56

Funds from State of Mississippi

	Balance from previous year	Receipts 1943-44	Total
Main station	$17,031.04	$34,500.00	$51,531.04
Substations	xx	80,500.00	80,500.00
Special appropriations*	4,181.62	12,500.00	16,681.62
Sales, substations	53,371.58	73,184.31	126,555.89
Donations	7,885.34	7,000,00	14,885.34
Tennessee Valley Authority	–1,365.59	5,519.49	4,153.90
Miscellaneous**	–1,646.25	28,939.56	27,293.31
TOTAL	$79,457.74	$242,143.36	$321,601.10

*Agricultural Marketing Project and Land Classification and Soil Survey Work.
**Group Insurance, Ellisville Junior College Project, and General Education Board Projects.